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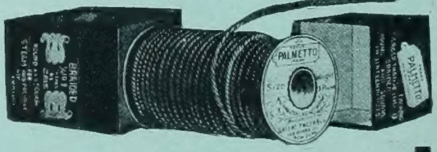

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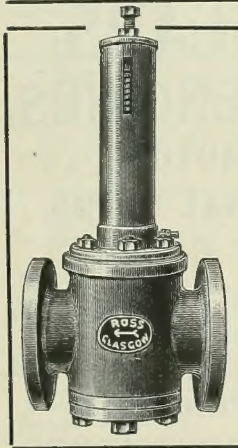

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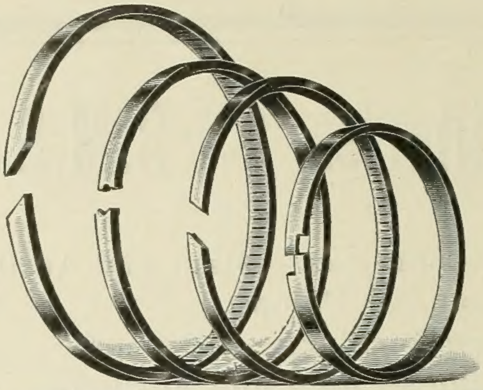

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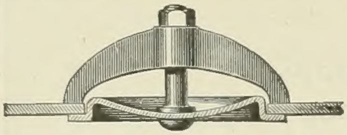

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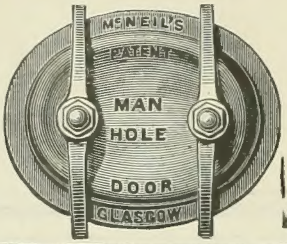

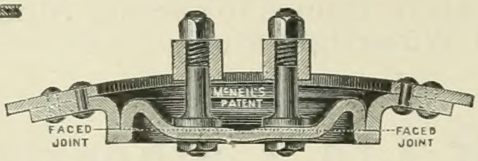

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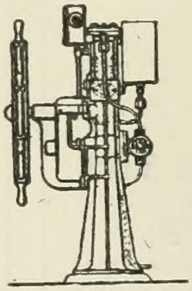

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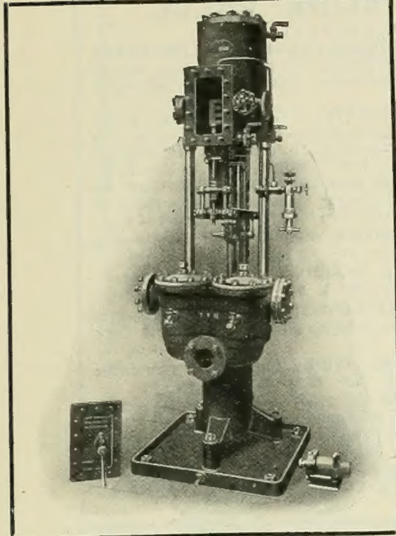

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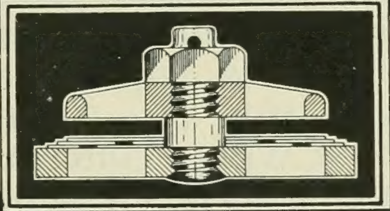

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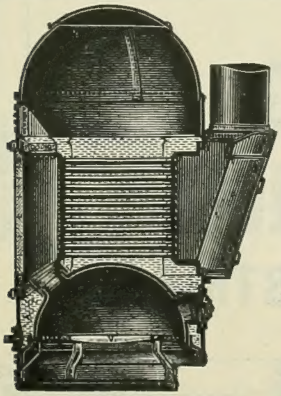

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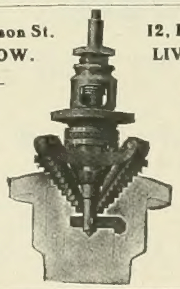

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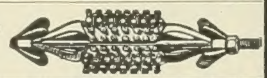

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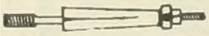

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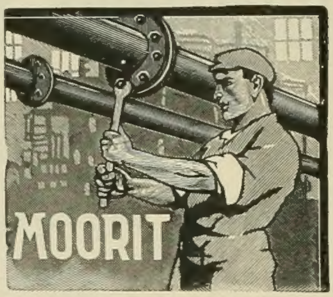

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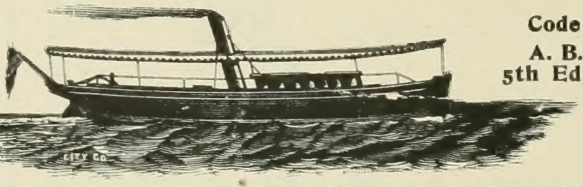

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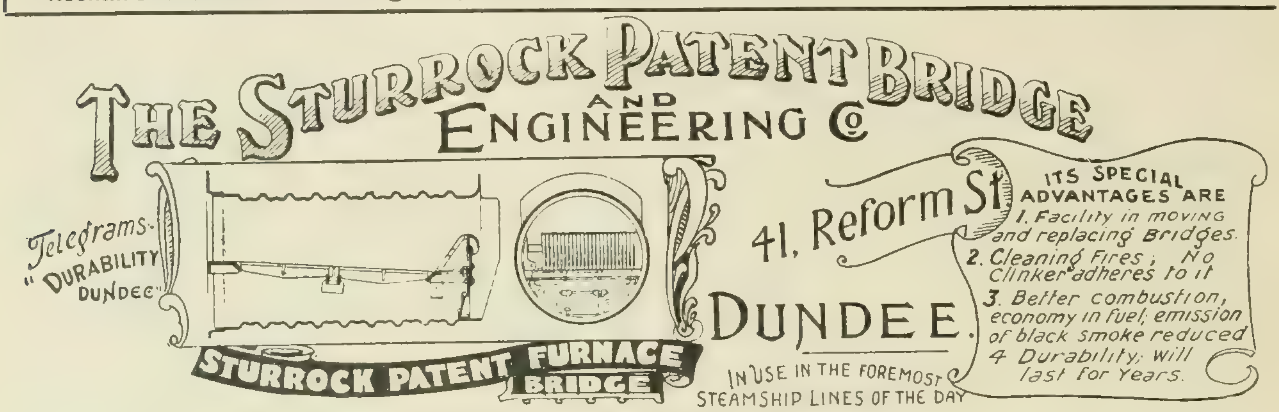

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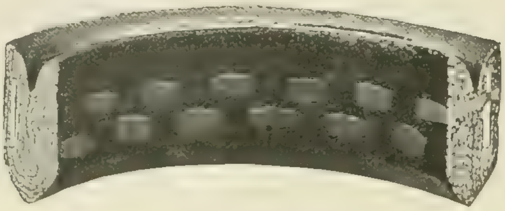

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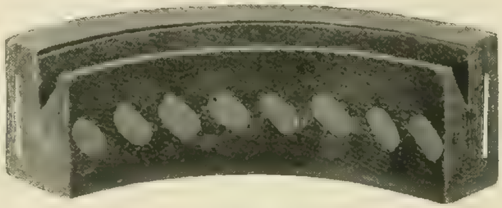

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LONDON, NOVEMBER, 1914.

BARIUM PEROXIDE AS A CARGO.

THE dangers associated with barium peroxide as a cargo have been before the public from time to time for some years past, and the official report issued by the Board of Trade dealing with the loss by fire in the North Atlantic of the Leyland liner, *Columbian*, brings the matter again into prominence. This chemical was formerly used for the production of oxygen gas, but the old method has been superseded, so that the peroxide is now principally used for bleaching purposes. The extent of the trade is shown by the evidence given at the enquiry, one witness stating that his company had manufactured 48,000 tons since 1891, while another stated his firm alone shipped 3,000 to 4,000 tons a year across the Atlantic. Previous enquiries both in England and Germany have taken place with reference to fires on board ships carrying this chemical, and the subject has been under consideration by large shipowners engaged in the Atlantic trade. It may be stated that the *Columbian* was a steamer of just over 5,000 gross tonnage, of 442 feet length and 45 feet beam, and was fitted with the usual equipment of this class of boat. The fire occurred at night, without notice, during conditions when the ship was rolling heavily. The fire developed very rapidly, explosions took place causing the death of some of the crew, and within three-quarters of an hour of the fire being noticed, the crew had left the ship and she was abandoned. The cargo carried was mixed and included tar oil, rags, and barium peroxide.

The first enquiry in England involving the carrying of barium was held in 1897 in reference to the loss of the *Rialto*, a vessel of 2,100 gross tonnage, which took fire upon a voyage from South Shields to New York. Among the cargo was five tons of barium packed in oak casks bound with steel hoops, each cask having two linings, one of calico next the cask and of butter paper next the contents. The ship met with heavy weather and laboured much, a short time after which she caught fire. After hearing considerable expert evidence on the subject the Court found it impossible to determine the cause of the fire, and expressed the opinion that peroxide of barium, if so packed as to preclude all possibility of leakage, is not dangerous. The Court was inclined to think that the substance was dangerous within the meaning of the Merchant Shipping Act, 1894. The next case was that of the *Cygnet* in 1904, a ship of 2,000 tons, bound from the North of England to Mediterranean ports. Similar conditions prevailed in this case both as to packing, heavy weather and explosions. The Court in this case found it impossible to arrive at a conclusion as to the cause of the fire, and looking to the facts that there have never been any fires or explosions traceable to peroxide of barium on board ships which have carried 25,000 casks in thirteen years, was of opinion that the peroxide was not dangerous within the meaning of the Act. The next case will readily be remembered by our readers, being that of the *Volturno*, which was destroyed twelve months ago whilst on a voyage from Europe to Canada and the United States. Among the cargo was a large quantity of peroxide of barium packed in barrels similar to those on the *Columbian*. In this case the Court reported that "Certainty is impossible, but the facts are that a fierce fire broke out very suddenly, and that there was among the cargo this super oxide of barium which, under the certain conditions that might not impossibly or improbably have arisen in this case, might have caused the fire, that every other reasonably probable cause of fire on board this ship has been enquired into, and that on the evidence the fire cannot with likelihood be attributed to any of them. While proof is not possible, the most probable explanation is that the fire arose from some super oxide of barium escaping from the drums, being exposed to friction, breaking into flames and igniting the cargo. The question as to carriage of chemicals, which in themselves are, or in certain conditions may become dangerous is a difficult one. It would not, having regard to the commercial effect, be reasonable to exact what might be prohibitory requirements, to guard against a danger so remote as to be fanciful; but, on the other hand, where the character of any substance is such that carriage under sea conditions renders it well within the bounds of probability that dangerous qualities may be developed, rules requiring it to be kept free from possible contact with inflammable material could not be otherwise than reasonable. The super oxide of barium carried by the *Volturno* may be considered as being within the latter category, and now that the danger, whether it did or did not cause the fire in this case has been established, the Court feels sure that the matter will receive full and proper consideration by the Board of Trade." In the same month that the *Volturno* was lost a fire occurred on board the German ship *Kalymnos* while on a voyage from Newcastle to Malta, and a violent explosion ensued. The enquiry held by the German authorities elicited the view that barium peroxide, while quite harmless in itself, will, if brought into contact with inflammable matter, such as sacking, fire with comparatively slight friction. The experts who gave evidence at the *Columbian* enquiry appear to have divergent views, for while Sir James Dewar and Professor Lewis adhere to their original opinion expressed in the *Rialto* case, that although barium peroxide is a possible source of fire in a ship, it is an extremely unlikely one; Mr. P. V. Dupré considers it a very likely one, and Dr. Passmore, while generally disposed to think it unlikely, did think it might, in favouring circumstances, act as a match to other combustible matter. With evidence of this character to deal with, it was very difficult, if not impossible, for the Court to come to any positive conclusion. However, in the opinion of the Court barium peroxide is of a dangerous nature within the meaning of the Merchant Shipping Act. The Court was, however, unable to determine the cause of the fire, although it has carefully considered every possibility which suggests itself. Two theories, both founded upon the nature of the cargo, were strongly urged upon the Court; *viz.*, the spontaneous combustion of bales of rags and the firing of barium peroxide in contact with wood. The Court considered the first as highly improbable, but is satisfied that if barium peroxide escaped from a damaged cask and was subjected to friction in contact with wood, it would be quite capable of causing a fire, but there was no definite evidence that this was in fact the cause of the fire in the case of the *Columbian*. Considerable attention was given to the question of stowage and the danger possibly involved owing to shifting cargo, as all the fires appear to have taken place either during or after heavy weather. The evidence showed that the casks and barrels were stowed in the ordinary way, with wooden quoins and wooden dunnage, and secured from moving fore and aft by bales of rags. They were placed in one tier only, on a deck rendered uneven by the existence of old cattle battens and broken cement flooring, and the Court considered that such conditions required extra precautions to prevent the cargo shifting, and particularly when cargo of such a dangerous nature is placed in the middle deck of the ship under hatches.

DERMATINE VALVES.—In 1911 some Dermatine Valves were supplied to a firm of pump makers in the north of England for use in a vacuum pump manufactured by them for a sugar refinery in London. The pump has been working practically night and day ever since, except for adjustments necessary with all new machinery. The valves were taken out recently, and the engineer informs us that although the valves have been working for three years, the wear on them is very slight. They have been put back in the pump with every prospect of working for some time. The engineer is willing to give every facility for the inspection of the valves by the engineers of other firms who write asking for an appointment.

TRAFALGAR DAY ANNIVERSARY.—The Navy League's Demonstration and Patriotic Concert, held on the anniversary of Trafalgar in the Opera House, Kingsway, London, was presided over by Sir George Reid, High Commissioner for the Commonwealth of Australia. There was a large and appreciative audience, and in the course of the evening opportunities were given to contribute to the fund for Belgian Refugees. The first part of the programme embraced National airs, rendered by the St. Michael's (Cornhill) Choristers, song, " Drake's Drum " by Mr. Gordon Cleather, the Belgian National Anthem by Mademoiselle Jean, repertoire by Mr. Maurice Farkoa, recitations by Lady Tree, songs by Mr. Boris Bornoff, concluding with the Japanese National Anthem, excellently rendered by the Band of the Royal Engineers. Sir George Reid then gave a pithy address, pointed with wit. Referring to the war and its effects on the hearts and minds of the sons and daughters of the Empire in drawing them together for the defence of truth and freedom, the after-results would probably be far-reaching in knitting even more closely the bonds of union in the interests of freedom from the would-be oppressor. Lord Charles Beresford then addressed the assembly, recalling the characteristics of Nelson and his influence upon the Fleet of his day, an influence which so moulded it that the *personnel* was imbued with the same spirit to-day. The nation whose Navy was opposed to Britain one hundred years ago fought gallantly and honourably, as became a brave race of men, now our friends and allies, fighting against the forces of oppression and wrongdoing. The Hon. Thomas Mackenzie, High Commissioner of the Dominion of New Zealand, proposed a resolution to the effect that a telegram be sent to Admiral Sir John Jellicoe expressing the confidence of the Meeting in the Fleet and heartiest wishes for an early and complete triumph over the enemy. The resolution was prefaced by a stirring speech on behalf of the Dominions overseas. It was seconded by the Hon. J. H. Turner, Agent General for British Columbia, and carried with acclamation. The second part of the musical programme consisted of selections by the Band of the Royal Engineers; song, the French National Anthem, sung by Mr. Maurice Farkoa, and the Russian National Anthem, sung by Mr. Boris Bornoff. The proceedings closed with the British National Anthem.

THE FLEETS OF THE MAIL LINES.

(From our Own Correspondent.)

The War and Merchant Ships.

The "Carmania's" Gallant Action.

THE *Carmania's* gallant action in sinking the Hamburg South American liner *Cap Trafalgar* in the South Atlantic loses nothing in glory when detailed accounts of the engagement become available. It would appear that the Cunarder first sighted the enemy at about 10 a.m. on the 14th September. The German was at the time coaling from one of three colliers which she had in company. On sighting the British ship the German fled, the colliers making to the eastward and the armed cruiser to the southward. The *Carmania* at once made chase, and, when she was four miles off, the *Cap Trafalgar* found there was no escape and so had to face her foe. The engagement commenced at ten minutes after noon with a shot from the Cunarder, and continued with full vigour for an hour, by which time the German showed signs of having had enough. She was on fire fore and aft, and was listing heavily to starboard. The *Carmania* herself had not by any means escaped injury. The fore bridge was burning; the officers' cabins on the navigation deck were wrecked, and the bridge telegraphs and steering-gear were put out of action. Gradually the big German heeled more and more to starboard till at last she was on her beam ends, her funnels nearly touching the water. Then she settled down forward and finally dived bow first, one hour and forty minutes after the commencement of the action. The survivors of her crew took to the boats and were picked up by one of the attendant colliers, the *Elenore Woermann*, which came up in time to fulfil that duty. The correspondent of a New York journal puts the place of encounter as 300 miles from Rio de Janeiro, and gives one detail which is not mentioned elsewhere. He tells how, after receiving a heavy punishment from the *Carmania's* guns, the German lowered her flag, whereupon a boat was put down by the Cunarder to take possession of her prize. As soon as the boat approached the *Cap Trafalgar*, however, it was fired upon and sunk with all hands, whereupon the British crew, very properly enraged at the murder of their comrades, opened fire with redoubled fury and sent the offending ship to the bottom. As soon as the enemy was accounted for, those on board the *Carmania* set to work to extinguish the fire forward. Whilst so engaged they perceived smoke on the horizon, which they believed to be that of a German warship—probably the cruiser *Dresden*. As they had been struck by seventy-nine projectiles in the course of the action, and were holed in 304 places, they were hardly in a condition to take on a fresh antagonist, and so they made the best of their way from the scene of their victory, reluctantly leaving the colliers untouched. On the next day they were picked up by a British warship which convoyed them till she could hand them over to another cruiser which took them to a safe anchorage where temporary repairs could be effected. The *Carmania* has since been to a dockyard and is now thoroughly equal to dealing with any other auxiliary cruiser of the enemy which she may have the luck to encounter. To the time of writing this engagement has still the distinction of being the only single ship action as yet fought in the present war.

The Cruise of the "Emden."

Details are now available as to the ravage wrought by the *Emden* in her noted cruise in the Bay of Bengal. She and one or two other cruisers of the German China squadron seem to have escaped from Kiao Chao when the Japanese blockade commenced. They were pursued by Japanese and British vessels as far as the Straits of Sumatra, where she apparently doubled back on them and so escaped. Nothing being heard of her for some time the Naval Authorities gave notice that commerce in Indian waters was not threatened by the enemy, and apparently a large volume of trade was ready to take advantage of the occasion. The first victim was the *Indus*, which left Sand Heads at 9 p.m. on the 7th September and was seized at 9 a.m. on the 10th. The *Lovat*, leaving at 10 p.m. on the 10th, was seized at 4-20 p.m. on the following day. The *Kabinga*, leaving the next day to the *Lovat*, was captured some thirty hours later, whilst the *Killin* fell into the captors' hands twelve hours after the *Kabinga*. In another twelve hours the *Diplomat*, most valuable prize of all, came along. Finally in that round came the inward-bound *Trabbock*, which was seized at 6 p.m. on the 14th September. The *Kabinga*, which had her master's wife on board, was not sunk, being reserved to take back the crews of the other vessels, and permission was given to all to take their personal belongings from their ships before they were sunk. But, at least in some cases, this permission did not do much good, as there was a sea running which made the transhipment of heavy packages in boats practically impossible. Anyhow the courtesy of the Commander of the *Emden* has been referred to by more than one of the sufferers at his hands, and honourable conduct on the part of a German sailor should be recorded.

The loss of these vessels, serious as it sounds, is but a small price to pay for the continuance of British commerce all over the world at a time when our nation is engaged with so powerful and unscrupulous a foe as our present enemy, who at the same time has the mortification of seeing his flag—as far as commerce is concerned—driven from the seas. How complete is the extinction, at all events for the time, of the German commercial flag was borne in upon me by the story of the *Graecia*. She was one of the numerous vessels—chiefly passenger and mail steamers of the Nord-Deutscher Lloyd and Hamburg-American Companies—which were found at the outbreak of war in the port of New York. There they seemed so hopelessly interned by the British fleet that a great endeavour was made to sell the whole lot to the United States. That failing, it was thought that some of them might run the gauntlet. So the *Graecia* was despatched to the Mediterranean. She was fortunate enough to escape our cruisers on the other side, but an obscure paragraph in a shipping paper records the fact that "the German steamship *Graecia* has been taken into Gibraltar." So the little experiment failed! Meanwhile there is talk of the American Government moving the *Kronprinzessin Cecilie* of the Nord-Deutscher Lloyd's express service from Bar Haven, Massachussets, to New York, as it is alleged that there will otherwise be danger of her being seriously damaged by ice in the course of the winter. The idea is to shift her without taking her outside the three-mile limit, and thus to avoid all chance of her being interfered with by British cruisers. This is not a very proud incident in the career of the fastest vessel which has ever flown the Nord-Deutscher Lloyd flag, especially as it follows on her undignified flight back to the American coast on the outbreak of hostilities.

Those British passengers—and they constituted three-fourths of her total complement of 185 persons on the list—who left Sydney, N.S.W., in the Nord-Deutscher Lloyd's steamship *Zieten* on the 8th July, must be sorry indeed that they shipped under an alien flag. The voyage seems to have been uneventful till, after calling at Colombo, she was within 120 miles of Aden. This was on the morning of the 6th August, just after the declaration of war. Then the *Konigsberg*, a German cruiser, Marconied her and told her not to go to Aden, but to go back towards the island of Socotra. Before they got there, however, further instructions bade them return to Aden. But off that port they were told to clear away, as British and French cruisers were in evidence. Then they skulked off the coast of Arabia, working towards the Persian Gulf, till the *Konigsberg*, which had by this time picked them up, went away to capture and sink the British steamship *City of Winchester*. Left to their own devices, and being now short of both water and coal, they made for Mozambique, which they finally reached. Their experience must have been most unpleasant. Though they had obtained some coal from the ill-fated *City of Winchester*, it was soon expended, and they were short of all comforts, and, being in deadly fear of capture, had to have all portholes closed at night. Passengers had to go to bed in the dark, and no singing or music were allowed. Martial law was enacted on board, and the decks were patrolled by nervous sailors armed to the teeth. Before they reached port a large quantity of valuable cargo had to be used in the furnaces—such costly things as cinchona bark and tobacco being used as fuel. When once they got to Portuguese waters the interests of the British passengers were looked after as far as might be, but they were still practically prisoners, and did not see any immediate prospect of getting home. They probably think by this time that it would have been better to have shipped under the Red Ensign after all.

Two Splendid Enterprises

stand to the credit of the British Mercantile Marine for October, 1914. But at the present time it is impossible to give details of what has happened. Suffice it to say that, whilst in August the British Expeditionary force was safely carried across the Channel and landed in France with all its guns, horses, motors, stores and equipment without the loss of a man, the later weeks have seen the accomplishment of similar results over a far wider stretch of water. The Indian troops have been brought in safety to Marseilles from Bombay, and the Canadian have been landed from a great Armada of transports at Plymouth. That the Mercantile Marine can carry on the ordinary commerce of the country and hugely increase the available supplies of food stuffs in these islands during the first weeks of a war with a powerful naval nation, and at the same time provide many fast and powerful vessels as auxiliary cruisers, speaks for itself. Of course, it would have been powerless to effect these operations, so vital for the safety of the country and so important for the future welfare of mankind, had it not been for the protection afforded it by the Royal Navy. The two services, Naval and Mercantile, have worked together completely and harmoniously, and have effected results which, had they been foretold in peace, would have been held well nigh incredible, since it has always been an axiom that it is not safe to move large bodies of troops over ocean voyages whilst a powerful naval foe has a fleet still in being.

In connection with

The Occupation of Antwerp

by the Germans, it is interesting to study the list of vessels shut up in that port at the outbreak of the war. There are altogether some thirty-two vessels concerned, and it is said that the number was so large, because the German authorities, never suspecting that the Belgians would resist the overwhelming force of their armies, had not troubled to warn the shipping people to get their vessels away. When once war was declared, departure was impossible, for the British Fleet was at the mouth of the river. So there the vessels had to stay, and a Prize Court was instituted at Antwerp, where a most important judgment was delivered in the case of the *Gneisenau*—the biggest and most important of the squadron. The names of the ships detained is official, having been supplied to the Foreign Office by the Belgian Minister, and it has been published in a supplement to the "London Gazette." The other particulars, as far as can be supplied, have been taken by us from Lloyd's Register.

Name.			Gross Tonnage.		Line.
Almeria	1903	Napier, Shanks and Bell, Glasgow	4,606	Electric light	Hamburg-Amerika
Andrée Rickmers	1907	Rickmers Co., Bremerhaven	4,173	Electric light	Rickmers
Atto	1901	Flensburg S.B. Co.	5,169	Electric light, wireless	Roland
Bellona	1900	Russell & Co., Greenock ..	1,041	—	Neptun
Christine Sell ..	1904	Nusiki & Co., Stettin	777	—	Sell
Croatia	1888	Blohm & Voss, Hamburg ..	1,991	–	Retzlaff
Delia	1907	Wood, Skinner and Co., Newcastle	1,224	—	Neptun
Delos	1889	Jas. Laing, Sunderland	2,214	–	Deutsche-Levante
Elbing	—	—	4,884	—	Deutsch-Australische
Elisabeth Rickmers	1906	Rickmers Co., Bremerhaven ..	4,174	Electric light	Rickmers
Erika	1906	Neptun Co., Rostock	2,666	Electric light	Ozean Dampfer
Feronia	1899	Harkess, Middlesbrough	691	—	Neptun
Ganelon	1907	Swan, Hunter and Co., Newcastle	5,586	Electric light, wireless	Roland
Gneisenau ..	1903	Vulcan Co., Stettin	8,185	Electric light, wireless, sub. sig.	Norddeutscher Lloyd
Hanau	1907	Flensburg S.B. Co.	4,213	Electric light	Deutsch-Australische
Hermes	1899	Ailsa S.B. Co., Troon	1,180	–	Neptun
Hispania	1891	J. C. Tecklenborg, Geestemunde ..	2,581	—	E. E. Retzlaff
Huberfels ..	1913	Weser Co., Bremen	5,814	Electric light	Hansa
Jade	—	—	536	—	Bugsir
Kalliope ..	—	—	—	—	—

Name.			Gross Tonnage.		Line.
Kandelfels ..	.. 1912	Weser Co., Bremen	5,739	Electric light	Hansa
Lesbos ..	.. 1890	Flensburg S.B.Co.	1,928	—	Deutsche-Levante
Lipsos ..	.. 1884	R. Dixen, Middlesbrough	2,381		Deutsche-Levante
Portimao	.. 1899	H. Koch, Lubeck	1,489	—	Oldenburg-Portug.
Santa Fé	.. 1901	Swan & Hunter, Newcastle ..	5,342	Electric light	H. Sud-Amerika
Schildturm	.. 1911	J. C. Tecklenburg	5,095	Electric light	Hansa
Sines ..	.. 1894	H. Koch, Lubeck	1,294	—	Oldenburg-Portug.
Sirius ..	.. —	—	—	—	—
Tasmania	..	—	7,514	Electric light	Deutsch-Australische
Totnes ..	.. —	—	7,130	Electric light	Kosmos
Ursula ..	.. 1892	Neptun Co., Rostock	913	—	Renata
Wartburg	.. 1905	Bremer Vulkan, Vegesack	4,295	Electric light	Hansa
Columbus, schooner		—	—	—	—
Perim, barque	—	—	—	—	—

Now it was first reported that before the evacuation of Antwerp all these vessels were blown up. Then it was said that they were disabled by having their engines dismantled and their boilers rendered useless. From the report of the Germans it would appear that the entrances to the docks were rendered temporarily impassable by the sinking of lighters laden with stones, and that the ships are still afloat, though they stated that the *Gneisenau*, most important of the captives, was gone. Finally they said that no Belgian or British vessels were found in the port. Even if they manage to make their former ships navigable again, it will not be an easy task, whilst the British fleet holds the North Sea, to get them out of the Schelde and away to their ports of register.

The "Noordam."

It is reported that the Holland-American liner *Noordam* struck a mine in the North Sea, and not only did the ship sustain damage, but some of those on board were injured. The *Noordam* is, of course, one of the larger passenger and mail steamships of the great Dutch Company. The loss of such a vessel would have been a terrible thing. For though the lives of passengers and merchant seamen are not more valuable than those of Naval men, it is always a more cruel business to kill helpless non-combatants and neutrals who are not out to kill and destroy their enemies, than those who at all events would certainly defend themselves and take the offensive if they had the opportunity to do so. Had the vessel been lost, as she might easily have been, the feeling in Holland against the indiscriminate way in which the Germans have sown the seas with mines would assuredly have been roused to a terrible extent.

The P. & O. Company.

The fusion of this Company with the British India Steam Navigation Company has now advanced another step. For during the month of October the last-named concern moved its head office from its old quarters into the well-known building in Leadenhall Street, and so the two sets of offices, though still carried on separately, are now housed under practically the same roof. On the 24th October there sailed from the Thames, on her maiden voyage to Bombay, the fine new twin-screw steamship *Kaisar-I-Hind*, so called in memory of the Delhi Durbar. She, of course, revives a name that forty years ago was very popular in the fleet. In her construction and equipment she may be briefly described as a vessel of the improved "M" class, though her tonnage appeared to be slightly less than that of the *Medina* and *Majola*.

(*Continued on page* 116).

Geared Turbine Machinery.—From the annual report of Parsons Marine Steam Turbine Co., Ltd., we learn that the number of war vessels, passenger and cargo vessels now built or building, with all-geared or part-geared turbine machinery, is 126, with an aggregate of about 1,000,000 horse-power; sixty-two such vessels with a total of 620,000 horse-power have been ordered since the date of the last annual report. Experimental investigations on propeller efficiency, carried out in the Company's vacuum tank, have given very valuable information, more especially in regard to the most suitable revolutions and pitch ratios for geared turbine installations for attaining the highest efficiency in the various classes of vessels.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(*From our Own Correspondent.*)

Portsmouth Dockyard.

The dockyard continues to present a busy spectacle. In every part activity is most marked. It was no idle boast that Mr. Churchill made to his audience at the London Opera House on September 11th, when he said that in the next twelve months the number of great ships which will be completed for the British Navy is more than double the number that will be completed for Germany. The number of cruisers, added the First Lord, is three or four times as great. Naturally this implies a good deal of whole-hearted energy and harmonious co-operation on the part of dockyard officers and workmen of all classes. In Portsmouth yard, the conduct of the 18,000 men now employed is very generally commended, and they have the satisfaction of knowing that, like their comrades in arms, they can show their patriotism and readiness to serve their country, even though they are not called upon to risk their lives for her. Of all the operations of the war, which are so keenly followed, few gave rise to more enthusiasm than the exploits of submarine *E9*, whose headquarters were at Portsmouth. The sinking of the cruiser *Hela* on September 13th, and of the destroyer *S126* on October 6th, are the only definite achievements of British submarines yet recorded, and Lieut.-Com. Max K. Horton must have received many congratulations on his good luck in bringing off both events. It speaks well for his skill in the handling of his boat and the training of his crew in marksmanship that he "bagged" both these vessels. A submarine's torpedo tubes, of course, are fixed, and to obtain a change of direction requires the shifting of the boat. Remembering that all this is done under water, the difficulties will be readily understood. Another event of the past month which gave the greatest satisfaction was the defeat and sinking of the German auxiliary cruiser *Cap Trafalgar* by the ex-Cunarder *Carmania*. This duel on the high seas between two vessels built for peaceful trade and passenger traffic must have been a thrilling and dramatic spectacle. From the professional standpoint, its significance lies in the fact that Captain Noel Grant, who formerly commanded the battleship *Irresistible*, attached to this port, established his superiority by manœuvring skill and good marksmanship. The loss of the *Fisgard* off Portland was most unfortunate, alike in regard to the lives sacrificed and to the valuable plant on board the vessel. Formerly employed as a boy artificers' training establishment, she was on her way to Devonport for duty as a depot when the accident happened. There are, however, other hulks available from which a substitute for her can be chosen. Three Portsmouth officers have been appointed to the new battleship *Emperor of India*, building by Messrs. Vickers; Captain W. C. M. Nicholson, from the torpedo schoolship *Vernon*, Commander F. M. Austin, from the naval barracks, and Lieutenant M. E. S. Boissier. The last-named officer will serve as Flag-Lieutenant to Rear-Admiral A. L. Duff when he hoists his flag. Osborne College has been re-opened for some weeks now, and the other establishments are continuing their work, as it is essential to keep up the supply of trained officers and men to the Fleet; retired officers have been appointed to take the place of those who have gone on active service.

Devonport Dockyard.

Of the vessels which have so far been into action, the new light cruisers of the "Arethusa" class seem to have proved their value more than any. Another vessel of this oil-burning type, the *Aurora*, has been completed at Devonport, and it will have been seen from the "Navy List" that she was commissioned by Captain A. G. Hotham on September 5th. Her crew are only waiting for such opportunities as fell to the lot of the sister-ships *Arethusa* and *Undaunted* to show what they can do. Other new construction at this yard is proceeding at a good rate, the more so as there have not been such heavy calls upon us for repairs as might have been anticipated. Had the Germans not decided upon a "wear and tear" game during the past three months, but sent their battleships or cruisers to sea instead, there might have been a regular bunch of our own vessels coming in more or less crippled. While the dockyards were evidently fully prepared for anything happening, it must be a matter of satisfaction that their resources have not so far been called upon in this way. The few losses caused by mines and submarines, deplorable as they are, must have been expected. The Fleet could hardly have continued to exercise its superiority in the infested waters of the North Sea without taking risks of the kind, and the real wonder is that more mishaps have not been reported. In other parts of the world, many Devonport ships have been busy. The *Cumberland's* work off the Cameroons called forth many commendations. The French cruiser *Bruix*, with which she has been working to cover the military expedition to which this German territory was surrendered, is an older and smaller vessel, well known to several British naval officers. The rich haul of prizes made by the *Cumberland*, too, was a lucky stroke, and the news was the more welcome because it was made known about the time that the *Emden* had snapped up half a dozen vessels in the Indian Ocean. The change of Flag-Lieutenant made on the Admiral's staff here on August 16th, when a retired officer relieved an active one, has since been followed at the other ports, the object being apparently to obtain the services of officers qualified in modern signalling work for duty in the Fleet, where they are probably more urgently needed. Lieut. A. C. N. Farquhar, from this port, became Flag-Lieutenant to Rear-Admiral A. H. Christian, and from Portsmouth Lieutenant M. E. S. Boissier has been appointed Flag-Lieutenant to Rear-Admiral A. L. Duff, while from Rosyth Lieutenant-Commander J. F. Houstoun has gone afloat in command of the *Linnet*. Similar changes have been made at the Nore and Queenstown.

Chatham Dockyard.

The past month has been an anxious one at times, so far as Chatham is concerned, for the cruisers *Aboukir*, *Hogue*, *Cressy* and *Hawke* were all attached to the Nore command and drew their crews from the Chatham port division. Some very sad scenes were witnessed at the first receipt of news of the losses. Regarded dispassionately, however, it is now generally admitted that the two affairs might have been much worse. Their one unhappy feature was the number of lives lost. The ships themselves were old, and can be soon replaced. It may be taken for granted that valuable lessons have been taught, and the authorities will manifestly see to it that they are applied, to prevent, if possible, future mishaps of a similar kind. There was much gratification that the prompt request of Commander R. A. Norton, who was saved from the *Hogue*, to be appointed to another vessel "as soon as he could get a kit" was acceded to by the Admiralty. The gallant officer was appointed on October 15th to be Flag-Commander to Rear-Admiral R. S. Phipps Hornby, in the *Lancaster*. This was a new post, as Admiral Hornby's previous staff in the *Glory*, according to the Navy List, only consisted of a flag-lieutenant, secretary and clerk. Coming on the day after the *Hawke* went down, the little scrap of the *Undaunted* and four destroyers of the "L" class roused great enthusiasm in Chatham on the afternoon and evening of Saturday, October 17th. All five vessels belonged to this port, and the satisfaction at the completeness of the engagement was increased by reason of the fact that Captain Cecil H. Fox was in command. This officer therefore avenged the destruction by a mine of his former ship, the *Amphion*, on August 6th. He only turned over to the *Undaunted* from the *Faulkner* on October 6th, when Commander the Hon. Herbert Meade, from the destroyer *Goshawk*, one of the boats in the Heligoland action on August 28th, succeeded him in the ex-Chilian vessel. The gracious visit made to Chatham by the King and Queen on October 3rd was a source of great pleasure not only to the wounded soldiers and seamen whom their Majesties came primarily to see, but to the townspeople generally. The King and Queen motored down from London in time to have luncheon with the Commander-in-Chief, Admiral Sir Richard Poore, at Admiralty House, and as they afterwards drove to the Naval Hospital the men of Lord Kitchener's Army turned out to line the streets, joining with the people in a hearty welcome to their Majesties on their mission of sympathy and kindness. Among the patients with whom they chatted was Commander F. F. Rose, of the destroyer *Laurel*, who was wounded seriously in both legs in the Heligoland action, but bravely continued on the bridge of his vessel. All his friends wish him a speedy recovery. Commander G. P. England, from the *Fisgard*, has taken his place in the *Laurel*.

Sheerness Dockyard.

The decision of the authorities to lay a minefield between the Kent coast and Ostend, announced on October 2nd, was welcomed as a step in the right direction. It was officially stated to have been called for by the German policy of mine-laying, combined with their submarine activities. The crews of the British minelayers may have begun to wonder when they were going to be called upon for their particular work. After refraining for two months from laying any mines, in accordance with the decision of the Admiralty and the Government not to resort to this particular form of warfare unless compelled, the old cruisers fitted out for the duty were at length ordered to mine an area ninety miles by thirty, or to be exact, from latitude 50 deg. 15 min. N., to 51 deg. 40 min. N., and from longitude 1 deg. 35 min. E., to 3 deg. E. In accordance with Hague rules, full warning was given to neutrals of this step, and charts showing the situation of the mined area were issued, instructions being also given to warships to warn east-going vessels of the presence of the minefield. Everything in fact, that could be done to lessen the inconvenience to neutrals was done, a policy which presents a vivid contrast to German practice. Next to the mining work, another phase of the Navy's activities in which Sheerness is rather more interested than the other ports is that of the Air Service. There is the charm of novelty about everything which this branch does, and the want of practical data before the war afforded a wide field for speculation on the part of those not intimately acquainted with its service. On the one hand, there were enthusiasts who apparently believed that airships and aeroplanes could do everything except talk, and on the other there were the croakers who only regarded air-craft as useless toys. It would seem from the official announcements that the naval airmen are gradually asserting themselves, proceeding without recklessness, but yet exhibiting great daring and skill. Apart from the patrol duties undertaken by both airships and seaplanes, along our coasts and oversea, detached squadrons of aeroplanes have been lent for land service in France and Belgium. Commander Samson, with one squadron, has been at Ostend and other places, and has done good work with his armoured motor cars. On one occasion he encountered a patrol of five Uhlans near Doullens, seventeen miles to the north of Amiens, and four of them were killed and the fifth captured without loss to our side. Another detached squadron has been under Squadron-Commander Gerrard. Some of his machines have made the raids on the Zeppelin sheds at Düsseldorf which have so thrilled the country. At the first attempt, on September 22nd, the fog interfered with good marksmanship, but Lieutenant Collet got off three bombs from a height of 400 ft. upon a shed. The damage done was not known. Another raid in the first week of October proved more successful, and bombs dropped by Lieutenant Marix from 500 ft. hit a shed, went through the roof, and destroyed a Zeppelin, flames being observed at a great height owing to the gas of the Zeppelin igniting. Compared with the plucky and splendid achievement of these airmen in flying over 100 miles into the enemy's territory and bringing off such a *coup*, the other happenings of the month seem rather commonplace. As at Chatham, where the wages bill has gone up to about £25,000 a week, there is plenty of work here for practically all grades, except perhaps wood workers, who have suffered because of the clearance from the ships of boats and other woodwork. This reminds me of an amusing yarn told by a petty officer of the cruiser *Warrior*, who wrote home to say that the Austrians had obtained the arm chair belonging to the captain of that vessel, and had consigned it to their museum at Fiume as the "last of the sunken cruiser *Warrior*." There was no doubt about the relic being genuine, but it had been thrown overboard with other inflammable gear when the ship cleared for action, and a sailing vessel happened to pick it up.

We are informed by The Cambridge Scientific Instrument Co., Ltd., that they have taken over the business connection of The Leskole Co., Ltd., Palace Works, Enfield, who have gone into liquidation, and that Mr. F. Wakeham, formerly assistant manager to the Leskole Co., has joined their staff.

CAPTURE OF ENEMY SHIPS.

IN addition to the lists given in our two previous issues, the following enemy ships have been captured. The names, which have been given out by the Foreign Office, are listed below, with particulars of tonnage, nationality and place of seizure.

Name & Tonnage.	Nationality.	Where seized.
Alfa, 3,365	Aus.	London
Aline Woermann, 3,133	Ger.	Captured off the Cameroon River
Apapa	,,	Algeria
Arnfried, 2,899	,,	Captured off the Cameroon River
Arzfels	,,	Port Adelaide
Bethania, 7,548	,,	Kingston (Ja.)
Bismarck	,,	South Africa
Caracas, 503	,,	Falmouth
C. Ferd Laeisz, 4,931	,,	Hong Kong
Elsbeth, 1,651	,,	Hong Kong
Emil	,,	At Alexandria
Erna Woermann, 5,528	,,	Captured off the Cameroon River
Frisia, 4,997	,,	Hong Kong
Fritz, 2,191	,,	Falmouth
Furth, 4,229	,,	Colombo
Gebruder, 91	,,	Alloa
Goldbek, 2,630	,,	Falmouth
Gria	,,	Sydney
Hanametel, 2,256	,,	Hong Kong
Hans Woermann, 4,059	,,	Captured off the Cameroon River
Heinz, 2,224	,,	Simons Town
Helgoland, 247	,,	Falmouth
Helmuth	,,	Zanzibar
Henriette Woermann, 2,426	,,	Captured off the Cameroon River
Jeanette Woermann, 2,229	,,	Captured off the Cameroon River
Kawak, 3,457	,,	Malta
Max Brock, 4,579	,,	Captured off the Cameroon River
Mediterraneo	Aus.	Plymouth
Olona, 1,943	,,	Plymouth
Orlanda, 2,185	,,	Falmouth
Ossa, 1,941	,,	Falmouth
Paul Woermann, 2,238	,,	Captured off the Cameroon River
Polnay, 3,682	,,	London
Ponape, 2,318	Ger.	Falmouth
Renata Amsinck, 3,824	,,	Captured off the Cameroon River
Rheinland, 333	,,	Sierra Leone
Slawentzitz, 3,391	,,	Gibraltar
Spreewald, 3,899	,,	St. Lucia
Tannenfels, 5,341	,,	Reported captured in Basilan Strait
Thor	,,	St. Lucia
Urania, 3,265	,,	Plymouth
Werner Vinnen, 3 145	,,	Sierra Leone

SHIPS WHOSE CARGOES, OR PART OF THEM, HAVE BEEN DETAINED.

These names are in continuation of those given in our October issue, page 68.

Name.	Nationality.	Detained at
Abonema	Brit.	Liverpool
Aburi	,,	Liverpool
Accrington	,,	Manchester
Aldworth	,,	Cardiff
Aleppo	,,	Hull
Alnwick Castle	,,	London
Andalusian	,,	Liverpool
Antilochus	,,	Liverpool
Antinœ	,,	London
Apollo	,,	Cardiff
Atahualpa	,,	Liverpool
Atreus	,,	London
Australind	,,	London
Avon	,,	Liverpool
Baltzer	Russ.	Dover
Bassam	Brit.	Liverpool
Besoeki	Dutch	Dover
Bintang	Brit.	London
Borderland	,,	Liverpool
Cardiganshire	,,	Hull
Celebes	Nether.	London
Celtic King	Brit.	London
Cherbury	,,	Liverpool
Chester		Portsmouth
City of Bradford	Brit.	Manchester
City of Cologne	,,	Dublin
City of Karachi	,,	London
Clan Cameron	,,	London
Clan Grant	,,	Liverpool
Clan Mackintosh	,,	London
Clan Mactavish	,,	London
Clarissa Radcliffe	Brit.	Bristol
Cluny Castle	,,	London
Colchester	,,	Harwich
Darlington	,,	Hull
Degama	,,	Liverpool
Denbighshire	,,	London
Derbyshire	,,	London
Dewsbury	,,	Manchester
D'Jebres	Nether.	Greenock
Ecclesia	Brit.	Manchester
Fairhaven	,,	London
Feliciana	,,	London
Fluent	,,	Liverpool
Gisella Groedel	,,	London
Glenstrae	,,	Glasgow
Gothland	,,	Manchester
Grantully Castle	,,	London
Gunwell	,,	Liverpool
Harrogate	,,	Hull
Henzada	,,	London
Hitachi Maru	Jap	Liverpool
Holly Branch	Brit.	Swansea
Huanchaco	,,	Liverpool
Hypatia	,,	Liverpool
India	,,	London
Iran	,,	Liverpool
Irrawaddy	,,	London
Jabiru	,,	Liverpool
Junin	,,	Liverpool
Juno	,,	Swansea
Kalomo	,,	London
Karina	,,	Liverpool
Katwijk	Nether.	Portsmouth
Kenawhan	Brit.	London
Kildonan Castle	,,	London
Kitano Maru	Jap.	London
Linmere	Brit.	Manchester
Lorenzo	U.S.A.	St. Lucia
Maasland	—	London
Malda	Brit.	London
Manningtry	,,	London
Marathon	,,	London
Marie Rose	,,	Bristol
Marmora	,,	London
Marthara	,,	Swansea
Medina	,,	London
Memnon	,,	Liverpool
Miningham	,,	Manchester
Mirimichi	,,	Manchester
Mitiana	,,	London
Mongolia	,,	London
Mount Temple	,,	London
Nagoya	,,	London
Neuralia	,,	London
Newmarket	,,	Harwich
Nias	Nether.	London
Nigeria	Brit.	Liverpool
Ningchow		Liverpool
North British	,,	Weymouth
North Pacific	,,	Weymouth
Novara	,,	London
Novarra	,,	Falmouth
Novo	,,	Hull
Oakmere	,,	Swansea
Orita	,,	Liverpool
Orama	,,	London
Orcoma	,,	Swansea
Orita	,,	Liverpool
Orsova	,,	London
Otranto	,,	London
Palma	,,	Liverpool
Palm Branch	,,	Liverpool
Panariellos	Greek	Swansea
Pellworm	Brit.	Manchester
Port Macquarie	,,	London
Prah	,,	Liverpool
Prahsu	,,	Liverpool
Reliance	,,	Cardiff
Ridley	,,	London
Riouw	Nether.	London
Romanby	Brit.	Liverpool
Salybia	,,	London
St. Andrews	,,	Liverpool
Scotian	,,	London
Sobo	,,	Liverpool
Sokoto	,,	Liverpool
Spenser	,,	Liverpool
Stockport	,,	Manchester
Staffa	,,	Leith
Swindon	,,	Bristol
Tamele	,,	Liverpool
Teespool	,,	Falmouth
Thistleban	,,	Bristol
Toscello	—	London
Tregurno	Brit.	Falmouth
Turakina	,,	London
Twickenham	,,	Dublin
Tyningham	,,	Cardiff
Umtata	,,	London
Vedra	,,	London
Vera	,,	London
Ville de Paris	French	Liverpool
Waiwera	Brit.	London
Walmer Castle	,,	London
Warwickshire	,,	London
Westbury	,,	Swansea
Wirral Coast	Brit.	Swansea
W. M. L.	,,	Plymouth
Wrexham	,,	Manchester
Yangtsze	,,	Liverpool

VESSELS DETAINED OR CAPTURED BY THE RUSSIAN NAVAL AUTHORITIES.

This list is compiled from information furnished by the Russian Government to the British Minister at Petrograd.

Name & Tonnage.	Nationality.	Where seized.
Ajax	Ger.	Riga
Albatross	,,	Libau
Alpha, 2,171	,,	Petrograd
Andromeda, 658	,,	Riga
Anna	,,	Petrograd
Annie	,,	Petrograd
Antarus	,,	Riga
Aristea, 3,364	Aus.	Petrograd
Asgard, 1,223	Ger.	Odessa
Athos, 1,742	,,	Novorossisk
Baro Fejervary, 3,886	Aus.	Odessa
Barone Edmondo Vay, 2,885	,,	Taganrog
Capella, 1,146	Ger.	Reval
Cygnus, 824	,,	Archangel
Diana	,,	Riga
Dortmund	,,	Nicolaiewsk-on-Amur
Dusseldorf	,,	Libau
Edoardo Muzil, 4,725	Aus.	Taganrog
Eger, 2,613	Ger	Petrograd
Elberfeld, 1,037	,,	Petrograd
Erika Fischer, 1,300	,,	Onega
Erna, 1,539	Aus.	Taganrog
Etha Rickmers, 4,101	Ger.	Odessa
Falck	,,	Riga
Florida	Aus.	Taganrog
Gregor, 3,969	Ger.	Odessa
Greif	,,	Port Loksa
Hans, 1,517	,,	Petrograd
Harz, 3,064	,,	Petrograd
Heidelberg, 1,661	,,	Petrograd
Herania	Aus.	Taganrog
Herman, 2,030	Ger.	Petrograd
Hetwig	,,	Archangel
Ida Zelck, 2,793	,,	Petrograd
Iris	Aus.	Taganrog
Irma	Ger.	Riga
Istok, 2,891	Aus.	Taganrog
Jocanda	,,	Kertch
Johanna Oelssner, 1,426	Ger.	Petrograd
Juno	,,	Narva
Kaethe Martha	,,	Riga
Karl Friedrich Larsen	,,	Onega
Kathe, 1,962	,,	Riga
Kathe Betty	,,	Riga
Koln, 7,409	,,	Petrograd
Kriemhild, 800	,,	Riga
Kurland, 512	,,	Petrograd
Laboe, 257	,,	Archangel
Minerva, 1,256	,,	Riga
Nordstern	,,	Petrograd
Olivia, 904	,,	Petrograd
Olga	,,	Odessa
Orissa, 3,392	,,	Petrograd
Pauline Hausbus, 403	,,	Petrograd
Paula Blumberg, 1,630	,,	Archangel
Peritia, 2,081	,,	Petrograd
Petersburg	,,	Petrograd
Phedra	,,	Riga
Priamus, 661	,,	Riga
Prima, 1,756	,,	Libau
Prince Christian	Aus.	Taganrog
Princessin Sophia Charlotte	Ger.	Petrograd
Prinz Eitel Friedrich, 1,525	,,	Reval
Regina, 141	,,	Riga
Rostock, 4,957	,,	Archangel
Russland, 680	,,	Petrograd
Sabine Rickmers, 4,165	,,	De Castries
Saxonia, 967	,,	Libau
Spezia, 3,781	,,	Vladivostok
Spika	,,	Reval
Stalhof, 1,459	,,	Petrograd
Stella, 2,808	Aus.	Novorossisk
Stella, 479	Ger.	Riga
Taurus, 1,225	,,	Kem
Temriuk	Aus.	Kertch
Tsar	Ger.	Reval
Utgard, 2,042	,,	Kovda
Varna, 1,820	,,	Kertch
Velzung	,,	Petrograd
Vergilia	,,	Petrograd
Volga	,,	Petrograd
Vulkan	,,	Riga
Westphalien	,,	Petrograd
Wilh. Hemsoth 2,017	,,	Libau
Zara, 338	,,	Onega
Zedina	,,	Riga

For a list of German vessels detained in Antwerp, at the time of its fall, see Fleets of the Mail Lines, page 93.

NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty :—

Engineer Captains.—T. H. Pounds (retired), to *President*, for service as Engineer-Overseer, at Messrs. Beardmore's, at Dalmuir; A. Hart (retired), to *President*, for service with Engineer-Overseer of gun mounting, at Messrs. Armstrong, Whitworth & Co., Manchester; A. R. Emdin; M. Sennett (both promoted to this rank from that of Lieutenant Commanders).

Engineer Commanders.—G. E. Andrew, to *Kent*, on commissioning; H. T. Garwood, to *Victory*, for *King Alfred*; H. L. Giles; F. Kelly; A. G. Archard; J. C. Pearson; J. Hamilton; E. J. Mowlam; J. H. Ireland, to *Revenge*; H. J. Leader (retired), to *Excellent*, for *Sirius*; L. Robins, to *Victory*, for *Amethyst*; H. G. Summerford, to *Victory*, for turbine and oil fuel courses; J. Sands (promoted to this rank and re-appointed), W. B. Hall, to *Victory*, for turbine and oil fuel courses; W. Hart, to *President*, for service in Naval Ordnance Department, temporary; F. C. Davis, to *Donegal*.

Engineer Lieutenant Commanders.—R. D. Nelson, to *Vivid*, for *Warspite*; R. Walker, to *Implacable*; R. A. Howley, to *Irresistible*; H. G. Haddy; R. J. Brown; J. R. Hoddinott; C. Howle, to *Pembroke*, for *Champion*; A. O. Wood, to *Victory*, for *Royalist*; R. D. Harvey (promoted to this rank and re-appointed); F. S. Carlisle, to *Vivid*, for *Morris*.

Acting Engineer Lieutenant Commander.—S. R. Dight.

Engineer Lieutenants.—V. G. le Mesurier (temporary), to *Racer*, for R.N. College, at Osborne; J. B. Hyde (temporary), to the *Illustrious*; H. Hodson, to *Vivid*, for *Donegal*; H. M. Kenny, to *Mars*; H. Evans, C. A. Booth, T. Pearson and G. S. McKenzie, all to *Victory*; E. W. Young (retired), to *Vivid*, for instruction of Boy Artificers; D'A. M. Chapman, to *Hannibal*; W. P. Smith, transferred to list of Engineer Lieutenants, for temporary service and re-appointed to *Victory*, for *Emperor of India*; S. G. Wheeler, to *Vivid*, for *Moorsom*, and to assist on Staff of Captain Superintendent, Clyde District; H. L. Quick, to *Magnificent*; F. N. Bennett; V. A. Brook, to *Argonaut*; W. C. Horton, to *Leviathan*; L. W. Wright, to *Bulwark*, and H. O. Hill, to *Tiger*, both for temporary service; J. M. Duncan, to *Jupiter*, temporary; A. E. S. Seccombe, to *Illustrious*; H. H. Wilson, to *Victory*, for *Queen Elizabeth*; S. H. Dunlop, to *Hindustan*; G. H. Turrall, to *Pembroke*; P. S. Oram, to *Victory*, for *Queen Elizabeth*; F. E. Gedge, to *Vivid*, for *Valiant*; W. H. Hall (retired), to *Victoria and Albert*; T. A. Bury, to *Victory*, for *Myngs*; H. Armstrong, to *Cæsar* (for temporary service); C. B. Evington, to *Pembroke*, for *Penelope*; F. L. Newhouse (Emergency List), to *Pembroke*, for *Cornwallis*; T. Killick (retired), to *Victory*, for H.M. Yacht *Alexandra*.

Engineer Sub-Lieutenants.—J. H. Sampson, to *Victory*, for turbine and oil fuel courses.

Temporary Commissions in the R.N.R. have been issued to the following gentlemen :—

Chief Engineer.—W. Downie.

Senior Engineers.—R. Brown, H. S. Hoar (promoted from rank of engineer).

Engineers.—J. Bruce, J. E. Bond, W. Booth, H. L. Goulden, A. J. Meldrum, R. Howat, C. Cowper, O. White, G. Pattison.

Assistant Engineers.—G. Robbie, B. Parker, C. A. Grimes, A. Roberts, E. S. Manning, L. Curtis, A. Thomson, W. R. Penney, W. Clark, G. Sheaf, W. H. Johns, F. J. Bradshaw, H. Marr, G. Salisbury, A. Stevenson, R. Spiers, T. Reid, D. Mitchell, W. E. Tutton, A. McC. Wylie, E. Jones, T. B. Richardson, W. Williams.

The following gentlemen have received temporary Commissions as Lieutenants in the Royal Marines, for duty with the Engineer Units of the Royal Naval Division :—R. G. Aston, L. H. Rugg, A.M.Inst.C.E., G. H. Spittle, A.M.I.E.E., A. J. D. Chivers, A.I.M.M., H. Dobell, A.M.I.E.E., R. Grierson, A.M.I.E.E., A.M.I.Mech.E., A. Williamson, A.M.Inst.C.E., T. C. Aveling, A.M.Inst.C.E., R. Stoltenhoff, Graduate I.Mech.E., G. W. Revell, A.M.Inst.C.E., G. E. Morgans, A.M.Inst.C.E. These units consist very largely of members of the Institutions of Civil, Electrical and Mechanical Engineers.

THE STRENGTH OF WELDS MADE BY THE OXY-ACETYLENE PROCESS.

Continued from page 75.

A NUMBER of welded bars of the same material were tested under repeated impact in the Stanton machine. The test bars were prepared six and one-quarter inches long, and one-half inch diameter. The bars were notched in the centre of the welded portion, the diameter at the bottom of the notch being four-tenths of one inch. The results of eighteen tests of welds after various treatments are shown in Table II., and, as was anticipated, very wide variations, not only between the mean results of each group, but also between individual tests, are shown. Analysing the results as before, there is obtained the following :—

Mean results of—	
2 Unwelded bars - - - - - -	100
6 Welds untreated - - - - -	54·1
3 Welds hammered - - - - - -	84·4
3 Welds reheated to 800°C. - - - -	65·3
3 Welds reheated to 900°C. - - - - -	59·3
3 Welds quenched in water, then reheated to 800°C	49·6
Lowest results of—	
6 Welds untreated - - - - - - - -	35·6
3 Welds hammered - - - - - -	74·5
3 Welds reheated to 800°C - - - -	55·7
3 Welds reheated to 900°C - - -	50·5
3 Welds quenched in water, then reheated to 800°C	33·9

Table II.

Repeated impact bending tests of ⅝ inch diameter round bars of mild steel welded.

Test pieces 6·25 inches long × 0·5 inch diameter. Diameter at bottom of notch 0·4 inch.

One inch pound blows. Bar reversed after each blow.

Notch placed in centre of weld.

Mark.	Description and Treatment.	Number of Blows to Fracture.	Means.
3	Unwelded and untreated - -	5164	5210
3 B		5256	
3 W	Welded—untreated - - -	3388	2819
3 W B		1856	
3 W C		3078	
4 W		2399	
4 W B		3178	
4 W C		3006	
3 H	Welded and hammered - -	4562	4402
33 H B		3885	
3 H C		4759	
3 A	Welded, heated to 800°C. for half an hour, and allowed to cool naturally - - - - -	2902	3404
3 A B		3089	
3 A C		4222	
3 × A	Welded, heated to 900°C for half an hour, and allowed to cool naturally - - - - -	2882	3003
3 × B		2030	
3 × C		3763	
3 Q A	Welded quenched in water, heated to 800°C. for half an hour, and allowed to cool naturally - -	3078	2580
3 Q B		1770	
3 Q C		2018	

---

*By Prof. A. Campion, F.I.C., and Mr Wm C. Gray, A.R.T.C. (The Royal Technical College, Glasgow), read at the summer meeting of the Institution of Engineers and Shipbuilders, Newcastle-on-Tyne.

It would thus appear that an average weld might be expected to withstand about half as much as similar material unwelded. Hammering has apparently been the most effective treatment, so far as increasing the fatigue-resisting properties of the material, but it must be borne in mind that the heating during the welding is extremely local, and consequently the metal in the immediate vicinity of the weld is liable to be at a comparatively low temperature, and there is a danger, when hammering, of vibrating or jarring a portion of the metal when it is at a black heat, which, as is well known, is productive of brittleness. If hammering is resorted to the metal should be reheated to a full red heat (800°C.), in order to remove strains or brittleness which might be set up during the process. Reheating or annealing alone appears to be of little value, so far as increasing the fatigue resistance of the welded portion is concerned.

Comparing the results in Table II. with the tensile test results, it is of interest to note that the form of treatment which gave the highest strength in tension has given the lowest result in the impact tests. The results in Table II. were obtained upon test pieces notched so that fracture occurred through the centre of the weld, but in actual practice fracture frequently occurs in the material in close proximity to the weld and not in the weld itself. This is due to the fact that in heating to fusion the ends of the pieces to be joined, the neighbouring metal becomes heated to a temperature sufficient to make it brittle. That such overheating takes place is easily seen by examining a longitudinal section of a weld which has been polished and etched in nitric acid.

(Some illustrations are produced by the authors showing a section through a welded boiler plate. The actual weld where fusion has taken place has a structure characteristic of cast metal. The portion immediately adjacent to the weld exhibits a coarse meshwork of overheated brittle metal. A further illustration shows the structure of the overheated portion after annealing.)

In order to see exactly what influence the presence of this overheated ozone exerted upon the weld as a whole, a number of welded bars of the same material as that used for the experiments already described were tested in the same manner as those referred to in Table II., except that, instead of the notch being made in the centre, it was put at the edge of the weld. The results are shown in Table III. The variations in the energy to fracture are even greater than in the case of specimens notched in the centre of the weld, as is shown by the following analysis:—

Mean results of—	
2 Unwelded bars	100
3 Welds untreated	57·3
3 Welds hammered	57·7
3 Welds hammered, and reheated to 800°C.	78·1
3 Welds reheated to 800°C.	98·7
2 Welds reheated to 900°C	74·7
Lowest results of	
3 Welds untreated	55·5
3 Welds hammered	29·8
3 Welds hammered, and reheated to 800°C.	53·2
3 Welds reheated to 800°C.	83·4
2 Welds reheated to 900°C.	73·0

It will be observed that the untreated and the hammered welds give almost the same percentage of the original strength, that of the untreated being slightly higher than the result in Table II., but the hammered specimens give an average of only 57·7 compared with 84·4 per cent. in the case of the specimen notched in the centre of the welded portion. This is undoubtedly due to the lowest result being only 29·8, and bears out what has previously been stated as to the danger of producing brittleness by hammering or jarring at a low temperature. On the other hand, reheating to 800°C. has, as might be expected, very nearly restored the material to its original strength; in fact, two specimens are actually stronger than the unwelded material.

Table III.

Repeated impact bending tests of $\frac{5}{8}$ inch diameter round bars of mild steel welded.

Test pieces 6·25 inches long × 0·5 inch diameter. Diameter at bottom of notch 0·4 inch.

One inch pound blows. Bar reversed after each blow.

Notch placed at edge of weld.

Mark.	Description and Treatment	Number of Blows to Fracture.	Means.
3 W D	Welded—untreated	3427	3088
3 W E		2896	
3 W F		2943	
3 H D	Welded and hammered	3230	3006
3 H E		4231	
3 H F		1556	
3 H A D	Welded, hammered, heated to 800°C. for half an hour, and allowed to cool naturally	4855	4071
3 H A E		2776	
3 H A F		4581	
3 A D	Welded, heated to 800°C. for half an hour, and allowed to cool naturally	4347	5144
3 A E		5226	
3 A F		6060	
3 X D	Welded, heated to 900°C. for half an hour, and allowed to cool naturally	3985	3895
3 X E		3806	

Reheating to 900°C has been less effective, due no doubt to that temperature being such as would cause overheating and a reduction in strength of the unwelded bar.

A series of repeated impact tests were carried out on plates of different thickness, and some of the results are distinctly interesting, as shown in Table IV. The notch was made in the centre of the weld in all cases, and the test bars prepared from the middle of the plates.

These results show very clearly that the thicker the plate the less reliable is the weld, and the greater the reduction in strength. Thick material also generally shows less improvement by annealing; in fact, under ordinary conditions, it is usually impracticable to anneal the material. In consequence of the highly local heating action of acetylene, there is considerable danger of contraction stresses being set up in the metal, and undoubtedly this contributes to the greater reduction in strength of thick material.

The case of a welded plate only one-eighth inch thick came under the authors' notice some time ago. It was sent them to examine and report upon, in regard to the relative strength of the welded and

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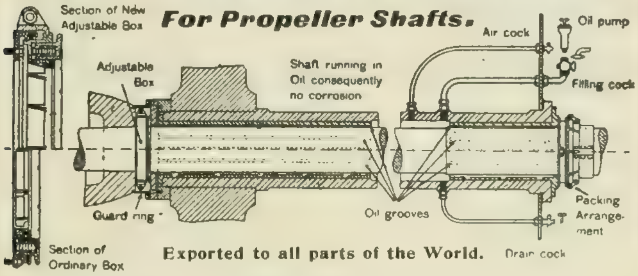

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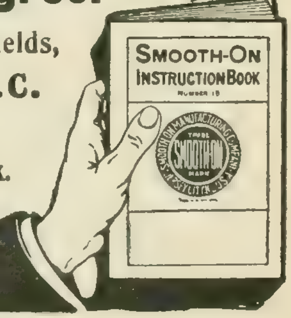

unwelded material, by a firm of tank makers, who had recently introduced acetylene welding of the seams instead of lapping and riveting. Transverse bending and tensile tests showed that the joint was stronger than the neighbouring metal. The material being too thin to obtain ordinary fatigue test pieces, narrow strips were cut about half an inch wide, some with the joint running transversely, and some with the joint running longitudinally to the strip. The strips were placed in a vice and bent backwards and forwards through 90 degrees until fractured. It was found that the welded strips required at least as many right-angle bends as similar strips of unwelded metal to produce fracture.

The metal being thin was quickly heated locally to fusion without damaging the neighbouring metal, and cooling being rapid the material in the neighbourhood of the join was probably in a much tougher condition than before the operation.

The danger of stresses due to unequal cooling being set up would also be reduced to a minimum in such material. As the thickness of the plate increases, a larger portion of the neighbouring metal becomes overheated, the cooling is slower, and the danger of contraction stresses being set up increases.

Table IV.

Repeated impact bending tests on steel plates of various thickness.

	Mark.	Description and Treatment.	Number of Blows to Fracture.	Means.
Plate ¾ in thick	C B	Unwelded	2,986	
	C B W 1	Welded	1,085	1,036
	C B W 2	Welded	987	
Plate 1 in thick	R 1	Unwelded—untreated ..	2,559	2,345
	R 2	Unwelded—untreated ..	2,132	
	R W 1	Welded—untreated ..	551	462
	R W 2	Welded—untreated ..	373	
Plate 1½ in thick	S	Unwelded—untreated ..	1,729	
	S W 1	Welded	413	432
	S W 2	Welded	451	

The authors, as the result of a large number of tests and experiments upon autogenous welds, conclude that, although there is a wide field of usefulness for oxy-acetylene and similar processes for joining or repairing steel plates, bars, etc., which are not required to resist very severe stresses, considerable caution must be exercised, and due regard paid to all the conditions before making use of them. A very serious responsibility attends the use of autogenous welding in cases where the parts are likely to be subjected to considerable mechanical strain. In any case, where failure tended to endanger life and limb, welds, if not entirely prohibited, should be accepted with extreme caution.

Autogenous welds always represent a somewhat uncertain quantity, as there is no means, except by destructive tests, of ascertaining whether a weld is good or bad.

Panama Canal.—The first steamers of the Pacific Steam Navigation Co. to pass through the Panama Canal were the *Potosi* of 4,375 tons and the *Bogota* of 4,603 tons.

REFRIGERATION RESEARCH.*

At the first monthly meeting of the Institution of Mechanical Engineers, held on October 16th, the Report of the Refrigeration Research Committee was read and discussed.

The Committee, which consisted of Sir J. Alfred Ewing, K.C.B., F.R.S. (Chairman), J. Wemyss Anderson, S. R. Beale, W. Worby Beaumont, Asa Binns, W. G. Brettell, Sir James Dewar, F.R.S., W. S. Douglas, J. H. Grindley, D.Sc., G. C. Hodsdon, Professor C. Frewen Jenkin, Magnus Mowat, F. A. Willcox and Hal Williams, were appointed "to consider and define a Standard in Refrigeration and its Units of Measurement." They have treated this reference as comprising two parts, namely:—

I. To consider what standard, if any, should be used for the practical rating of refrigerating machines, as a means of expressing the amount of refrigerating effect which the machine is capable of producing under specified conditions such as occur in ordinary practice.

II. To consider what theoretical cycle of action should be adopted as a standard for comparison with the actual performance of a refrigerating machine working under any conditions, as a means of judging how nearly the real action approaches the ideal.

Under the first head the Committee have come to the conclusion that a suitable unit of rating should be established, to be based on some unambiguous measure of performance, so chosen as to make it possible that the unit may meet with general acceptance for international use. They consider that any rating on an ice-making basis is objectionable, and have finally adopted the calorie per second as the measure of refrigerating effect. This unit is equivalent to 342,860 B.Th.U. per day, the calorie being the amount of heat required to change the temperature of 1 kilogram of water by 1° C.

For the purpose of rating refrigerating machines, the Committee have specified the following standard conditions:—the temperature limits to be steady; the temperature of the cooling water to range from 15° C. at inlet to 20° C. at outlet, and that of the brine from 0° C. to — 5° C. The amount of refrigeration in calories per second produced under these standard conditions is to be called the *rated capacity* of the machine. This mode of rating is intended to apply to absorption as well as vapour-compression machines. In cases of cooling by direct expansion without the use of brine a temperature of —10° C. in the working substance is to be taken as the lower limit, in lieu of a brine temperature, in specifying the standard conditions.

Under the second head, the recommendations of the Committee deal only with vapour-compression machines. In formulating a theoretical cycle of comparison the limits of temperature to be considered are not those external to the machine, but those of the working substance itself at corresponding stages of the cycle. In the theoretical cycle it is assumed that the working substance suffers adiabatic compression between two constant limits of pressure, namely, the pressure of suction and that of discharge to the condenser. These two pressures must accordingly be known, and also the temperature to which the substance is cooled before it reaches the expansion valve.

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*Abstract of the Report of the Refrigeration Research Committee

In order to make the theoretical performance in the cycle of comparison as efficient as possible, it is assumed (1) that the working substance is cooled to the temperature of the cooling water before passing the expansion valve, and also (2) that the degree of dryness in the vapour before compression is such as to secure the maximum co-efficient of performance in the ideal cycle. These conditions completely specify the ideal cycle which the Committee recommend should be adopted as a standard for comparison with the actual performance of any vapour-compression machine. It is a cycle employing adiabatic compression, in which the pressures of suction and condensation are the same as those of the actual process, and in which the substance is supposed to be cooled before expansion to a temperature equal to that at which in the actual process the cooling water is supplied.

The ratio of the real co-efficient of performance to the co-efficient of performance in the ideal cycle is called the *relative efficiency*. This affords a figure showing how far the actual performance falls short of the theoretical ideal.

The Report goes on to point out the great convenience of graphic methods in calculating the ideal performance, and especially the advantage for this purpose of the ϕI. chart introduced by Mollier, the co-ordinates of which are the entropy ϕ and the total heat I. Charts of this kind, drawn for the Committee by Professor C. F. Jenkin, are issued with the Report, for the three substances chiefly used in refrigeration, namely, ammonia, carbonic acid, and sulphurous acid. These charts employ oblique or skew co-ordinates, and one of the Appendixes to the Report consists of a note by Professor Jenkin explaining this feature.

Another Appendix contains Tables setting forth numerically certain properties of the same three substances, and also a Table of the specific heat of calcium-chloride brine.

The remaining Appendix is a Paper by the Chairman (Sir Alfred Ewing) dealing with the quantities involved in the process of refrigeration and with the graphic analysis of the process. It is pointed out that besides pressure, temperature and volume, three other functions of the state of the substance are important in connection with the theory of refrigeration, namely, the internal energy, the total heat, and the entropy. The meaning of these quantities is explained and their application in the discussion of refrigeration cycles is discussed. Illustrations are added to show the use of graphic processes, employing both the entropy-temperature diagram and the Mollier diagram in which the co-ordinates are the entropy and the total heat. A construction is given for finding by means of the Mollier diagram the degree of initial wetness which will secure the maximum co-efficient of performance in the ideal cycle, and the co-efficients are determined graphically in a number of representative cases.

The Committee ask for powers to carry out experimental researches, with the object of supplying data that are not now available regarding the physical properties of substances used in refrigeration.

TRINITY HOUSE.—Captain Owen Jones, R.D., R.N.R., formerly in the service of the P. & O. Company, was, at a special court of the Corporation of Trinity House, held recently, elected an Elder Brother to fill the vacancy caused by the death of Captain Flint, R.N.R. Captain Jones is an "old Conway."

THE U.S.A. BATTLESHIPS "OKLAHOMA" AND "NEVADA."

THE battleship *Oklahoma* which was launched from the New York Shipbuilding Company's yard on March 23rd, together with her sister the *Nevada*, which is under construction at the yard of the Fore River Company, introduces a new era into the evolution of warship design in the States, in as much as in them the big guns are mounted for the first time in triple turrets, following the example set by Italy in the *Dante Alighieri*, and copied by Austria in the *Viribus Unitis*.

The previous *New York* and *Texas*—which have just entered into commission—carry the same armament as the ships under notice, *viz.* :—ten 14 in. guns, but have their weapons disposed in five twin turrets along the centre-line, two forward and three aft, the second and fourth being raised to obtain axial fire over the fore and aftermost turrets. In the *Oklahoma*, three guns have been placed in two turrets, and raised to fire above these are four guns in twin mountings—the fire ahead and astern being thus five instead of four guns as previously.

The 14-in. gun mounted in these latest ships is a very much more powerful weapon than the 12-in. gun which has hitherto formed the primary armament of U.S. battleships. Its muzzle energy is 66,000 foot-tons against the 49,000 foot-tons of the 12-in. and the shell fired weighs 1,400 lbs. instead of only 870 lbs. and carries a correspondingly higher bursting charge.

The dimensions of the "Nevadas" are : Length overall 583ft., beam 95¼ ft., draught 28½ ft., giving a displacement of 27,500 tons, or 500 tons more than the "Texas" class. Both of the ships will rely upon oil fuel exclusively, the supply being 598,400 gallons (about 2,000 tons); the *Nevada* will have Curtis turbines and the *Oklahoma* reciprocating engines, steam being generated in twelve Yarrow boilers in the former and twelve Babcock in the latter. In both the designed H.P. is 24,800 tons and the speed 20·5 knots.

As regards protection, a new system of armour disposal has been introduced into these ships which is more or less revolutionary. Instead of the armour being distributed from 12 in. to 5 in. as has been the usual custom, a greater portion of the displacement has been allotted to defence and the armour massed along the waterline and upon the turrets only, leaving the greater part of the hull and all the secondary guns without any protection more than the ½-in. plating of the ship's side. This "All or Nothing" method of defence is based upon the surmise that it will be better to keep the largest shells out where they can do damage and let them pass through parts which are not vital. The medium armour of 6 in. to 8 in. which serves for battery protection in most armoured ships is regarded as insufficient to stop big projectiles and therefore only so much useless and additional weight which might be expended and utilised to more advantage by increasing the armour thickness over positions which are vital, such as the water-line, turrets and conning-tower.

Reference to the plan will show the extent of the *Nevada's* protection. The main belt is 17½ ft. wide and at mean draught will extend from 9 ft. above to 8½ ft. below the water-line. The thickness is 13½ in. from the upper edge down to within a few feet of its bottom where it reaches a minimum of 8 in., and it covers 400 ft. of the hull. Forward it reaches well forward of the first turret and is then taken right across the ship as a 13-in. bulkhead ; aft it extends some 30 ft. beyond the fourth turret to its full depth of 17½ ft. when there is a jog down to 8½ ft., at which it continues for 60 ft., when it turns in-board as a bulkhead of 13 in.

The method of laying on the plates is also novel, for instead of their being placed horizontally in two strakes with a continuous join near the water-line, they are laid vertically so that there is no continuous joint—a method which we believe has also been adopted in the *Seydlitz* and later German ships.

The two protective decks are as shown in the plan ; above is a 3-in. flat deck, 9 ft. above the water-line and below one 1½ in. on the flat and 2 in. on the curve where it slopes to reach the lower edge of the belt 8½ ft. below the water-line.

The barbette armour reaches down to lower deck, being 13½ in. where it is unprotected by the side armour and 4½ in. below this between the two armour decks. The two sorts of turrets have different thickness of armour, that on the triple ones being 18 in. on the face, 9 in. on the backs and 5 in. roof while the twin positions have 16 in. faces. The sides of all four turrets are from 9 to 10 in. thick.

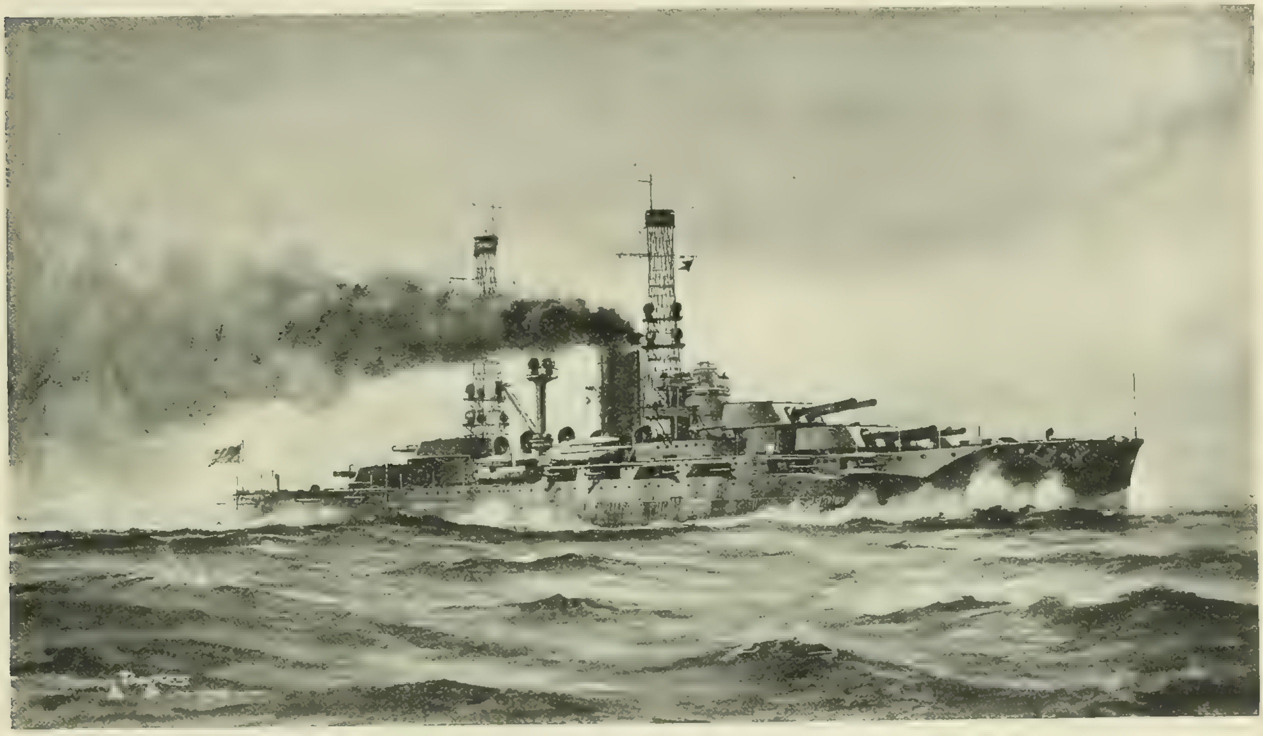
Forward there is a 16-in. conning-tower, the communication tube extending down to the protective decks and being of the same thickness. The small bridges are built around the conning-tower and on top of it will be a range finding station; the whole structure is perhaps one of the biggest yet put into a ship of war.

A noticeable feature of the "Nevadas" is their single big funnel instead of the two or three hitherto characteristic of United States ships, this has been made possible by the concentration of all the boilers into the central part of the ship, the boiler rooms being six in number and only occupying 65 ft. The saving of space has been made possible by the adoption of oil fuel only which is mainly carried in the double bottom, thus leaving the large amount of space which would be otherwise occupied by coal bunkers free. The funnel base is protected by 13-in. armour instead of the 2 in. to 6 in. which usually obtains in other battleships.

In addition to the main armament of ten 14-in. guns there is a secondary battery of twenty-one 5-in. guns, which are placed along the upper and main decks and on the superstructure, ten on each side and one in the stern. The forward guns are recessed back to allow for axial fire, and the rest have wide angle ports to allow for ample arcs of training. Twelve are on the upper and seven on the main decks and two on the superstructure forward.

As is usual in U.S. ships, there are a couple of basket masts with the control top and searchlight platforms, and crane masts also bearing projectors. The torpedo equipment consists of four submerged 21-in. tubes.

A table showing her details as compared with those of her contemporaries is given below, and is interesting in demonstrating the various ways of grouping big guns. Italy and Austria favour the triple turret, and still retain the 12-in.



U.S. Battleship *Nevada*. Length over-all, 583 ft.; Beam, 95¼ ft.; Draught, 28½ ft.; Displacement, 27,500 tons.

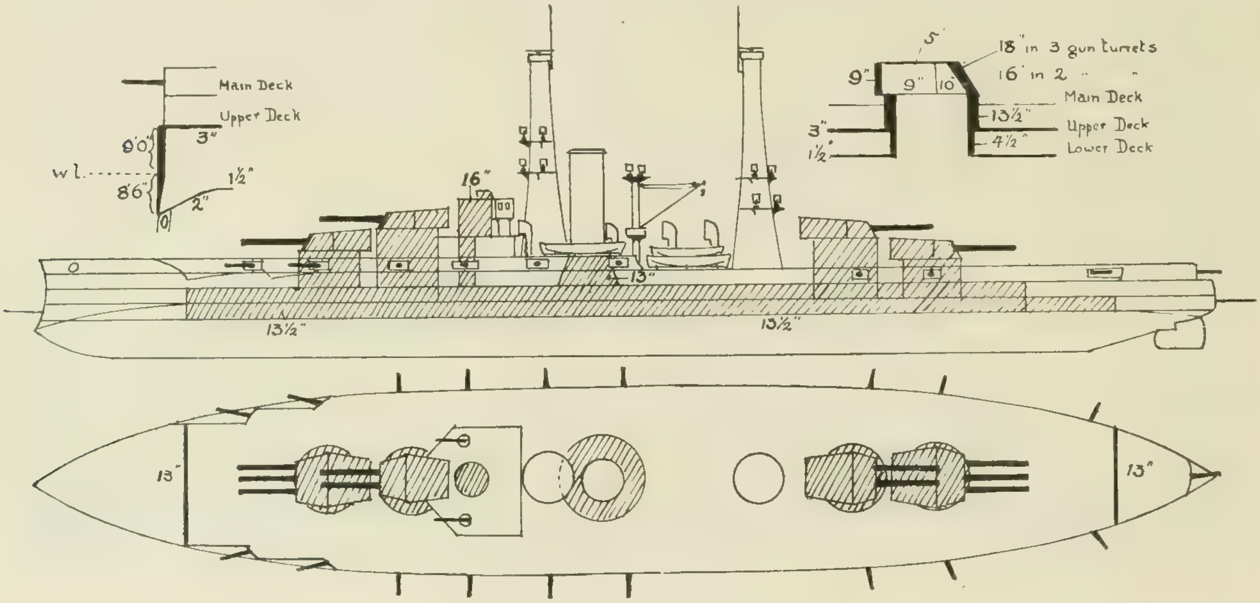
COMPARATIVE TABLE

Nation.	Type.	No. in Class.	Displacement.	H.P.	Speed.	Armament.	T. Tubes.	Armour.* A	B	C	D	
						in.		in.	in.	in.	in.	
BRITAIN ..	*Q. Elizabeth*	5	27,500	58,000	25	viii. 15 xvi. 6	5	13½	10	13	6	Twin turrets
CHILI ..	*A. Cochrane*	2	28,000	37,000	22	x. 14 xvi. 6	4	9	7	10	6	Twin turrets
FRANCE ..	*Normandie*	4	24,850	35,000	21	xii. 13·4 xxiv. 5·5	4	12½	8	17	—	Quadruple turrets
GERMANY ..	*Konig* ..	4	25,500	34,000	21·5 23	x 12 xiv. 6	6	13	8	13	8	Twin turrets
ITALY ..	*A. Doria* ..	2	22,000	24,000	22·5	xiii. 12 xvi. 6	3	11	9	10	6	2 Twin turrets 3 Triple turrets
JAPAN ..	*Fuso* ..	1	30,000	45,000	22·5	xii. 14 xvi. 6	5	9	8	12	6	Twin turrets
RUSSIA ..	*Gangut* ..	4	23,000	42,000	23	xii. 12 xvi. 4·7	4	10	8	12	5	Triple turrets
U.S.A. ..	*Nevada* ..	2	27,500	24,800	20·5	x. 14 xxi 5	4	13½	0	18—9	0	2 Twin turrets 2 Triple turrets

* A = Belt B = Side above Belt. C = Big Guns D = Secondary Guns

gun—although bigger pieces are designed for later ships. England alone goes in for high speed and 15-in. guns, while Chili, Japan and Greece have adopted the 14-in. gun. France introduces the quadruple turret which has yet to prove its worth, and Germany combines an armament of 12-in. guns with very thick armour and high speed.

Of them all the *Queen Elizabeth* is of course the most powerful, with the rest all on much of the same level. Where one excels in protection the other makes up for thinner armour by heavier gun-power. None have as yet followed the United States " All or Nothing " lead in protection, but it is probable that the trend of design will come round to that view. No better phrase than Mr. Churchill's " Eggshells smashing each other with hammers " could be found to describe the present *impasse* into which the increasing size of big guns has landed the naval constructor, and the whole aspect of things seems to portend some absolutely new path of development. At present it is doubtful if any ship could stand the hammering she could receive from say the *Queen Elizabeth*. Moderately thin armour may serve some purpose in keeping out small projectiles, and the results of the fire by the 6-in. gunned cruisers on the *Empress of India* showed that these secondary guns were capable of practically making a ship unworkable—but the *Nevada* system of armouring seems to offer the only solution to the difficulty at present.



Plan of the U.S. Battleship *Nevada*.

In the past the same sort of development led to the *Inflexible* with her four 80-ton guns and patch of 24-in. armour amidships to protect them. To-day we are faced by the advent of the same condition of things, and unless some fresh method of preparing armour comes along which will make plates of the same relative increase of resistance over the Krupp as Harvey was over iron, then numbers will have to replace individual concentration. When the largest guns can be mounted in moderate-sized ships, and these have the power of disabling the heaviest armour clad, since the necessary concentration of armour can only be obtained by leaving the rest of the hull exposed, then it appears as if the day of the 30,000-ton ship is drawing to a close. For a time we shall continue to build mastodons. To what size these mastodons will continue to grow is a point upon which it would be nigh useless to prophesy ; that a hark-back to smaller dimensions is coming about is indicated, as is also the advent of the 16-in. gun. Whether or no they will be combined in the same ship or whether two or more classes of battleship will be utilised—one very fast and with the biggest guns, but with a minimum of protection, and the other slow, heavily gunned and completely armoured—remains for time to decide. One thing only is certain, and that is that the torpedo, submarine and big-gun will not allow of the present evolution cycle to long continue.

GYROSCOPIC COMPASSES.

A paper on " Gyroscopic Compasses, with particular reference to the 'Sea Star' type," was read by Mr. E. Kilburn Scott at a meeting of the Institute of Marine Engineers, held on October 5th. In the course of his paper the author said the advent of the iron ship rendered the use of the ordinary compass unsuitable, and compensating devices had to be added to minimise the effect of outside magnetic influences. Even with the best of these devices, however, the compass has never been entirely satisfactory. On warships especially the compasses are very susceptible to variations because of the large masses of steel, such as guns and turrets, which have to be moved, and which thus alter the induced and the semi-permanent magnetism. The conditions on submarines are such as to render magnetic compasses most unreliable for these vessels.

Another type, the gyroscopic compass, has therefore been developed, which is quite independent of the earth's magnetism. The gyroscopic compass possesses a directive force in some respects analogous to the magnetic compass, and according to the direction of spin of the wheel, the ends of the gyro-wheel axis may be called the north-seeking and south-seeking. The tendency to seek the pole is, however, many times greater than is possible with the magnetic compass, and it mainly depends on the effect of the earth's rotation on a rapidly spinning wheel, the kinetic energy of which may be made as much as desired. A great advantage of the compass is that it is easy to repeat all the movements on repeater compasses, while the master compass can be placed in a position where it is absolutely safe. Any kind of metal can be used in close proximity to a gyro-compass.

Although Foucault discovered as long ago as 1852 that, when suitably constructed, the gyroscope tended to point to the true or geographical north, it is only within the last few years that practical instruments have been constructed which will work on board ship.

The Anschutz type, evolved by Dr. Anschutz in

1900, is of pendular construction and is free to swing under the influence of gravity. To counteract the effect of violent rolling three gyro-wheels are employed. The wheels run at about 20,000 revs. per minute, and the periodicity is 333 per second. Spirit levels attached to the card indicate at once if the compass is pointing true north.

The Sperry compass is suspended by means of a wire and is provided with an automatic "follow-up" device to take the twist out of the suspension wire directly the gyro-wheel moves, and to relieve the gyro-wheel from the task of overcoming friction round the vertical axis. The follow-up motor is a most essential feature of the Sperry compass. It drives round the compass card, transmitting gear, etc., and leaves the gyro-wheel very little work to do. The latter can thus be made extremely sensitive to precessional action set up by the earth's rotation. The wheel revolves at 8,600 revs. per minute and the periodicity is 145 per second.

The errors peculiar to these compasses, for which allowances are to be made, are those due to latitude, change of latitude at constant speed, change of speed, rolling and pitching, slowness of gyroscope and those produced by steering. These errors, the author stated, could be traced to one feature which both the Anschutz and the Sperry compasses have in common, viz., that they are pendular, that is to say they depend upon the force of gravity to be effective.

The "Sea Star" type, designed by Capt. V. H. Rozic and the author, is so arranged that the righting momentum does not depend on gravity for its magnitude, but is always determined by the amount of deflecting momentum that has to be counteracted. The means to this end are forcible and automatic. Another feature is that the gyro-wheel is so mounted that it is non-pendular about its horizontal axis, and therefore is not subject to ballistic effects. One object in view is to dispense with correction tables and mechanical correctors; another, to devise an instrument that could be made small and cheaply so as to be of use on merchant vessels, aeroplanes, etc. The "Sea Star" differs from the Anschutz and Sperry types in that the direction of rotation of the gyro-wheel is clockwise when looking at the north pointing end of the gyro-wheel spindle. The other two run counter clockwise. Owing to the direction of rotation of the "Sea Star" gyro-wheel being opposite to the rotation of the earth, the gyro-wheel is in a state of permanent unstable equilibrium and, therefore, as soon as it has been deflected in the slightest degree, there is a strong tendency to increase and the motor is immediately started to correct the deviation. There is thus a very great sensitiveness when in the meridian, and this sensitiveness allows the "Sea Star" type to be built in small sizes for the kinetic energy of the wheel is of lesser importance than with other compasses.

MERCHANT SHIPBUILDING.

In consequence of the war, Lloyd's Register Shipbuilding Return, for the quarter ended 30th September, 1914, does not contain the usual information regarding the shipbuilding industry throughout the world, but confines itself to merchant ships in course of construction in the United Kingdom.

The Return take into account only vessels of 100 tons and upwards, the construction of which has actually begun, and shows that, excluding warships, there were 486 vessels of 1,723,550 tons gross under construction in the United Kingdom at the close of the quarter stated above. The particulars of the vessels in question are as follows, similar details being given for the last quarter and for the 30th September, 1913, for the purpose of comparison:—

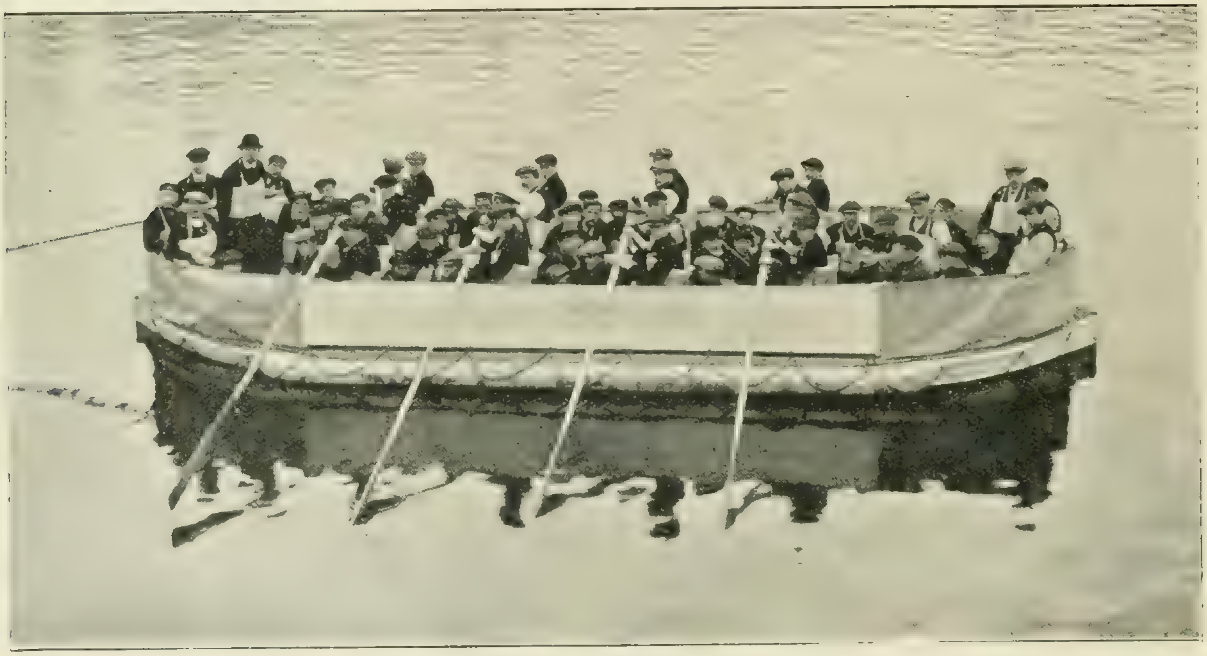
Description.	30th Sept. 1914		30th June 1914		30th Sept., 1913.	
	No.	Gr. tonn.	No.	Gr. tonn.	No.	Gr. tonn.
STEAM.						
Steel	469	1,718,585	463	1,717,747	487	1,982,27[illegible]
Iron	..	..	..		..	..
Wood and Comp.	1	145	..	..	4	15
Total	470	1,718,730	463	1,717,747	491	1,982,423
SAIL.						
Steel	14	4,470	13	4,277	15	4,725
Iron	1	250	..	..	..	..
Wood and Comp.	1	100	1	100	2	106
Total	16	4,820	14	4,377	17	4,831
Total	486	1,723,550	477	1,722,124	508	1,987,254

Whilst the tonnage now under construction in the United Kingdom is about 1,400 tons higher than that which was in hand at the end of last quarter, it will be understood that the rate of progress in merchant ship construction is much reduced in the present circumstances and that the immediate output will be correspondingly less than that which would be attained under normal conditions. Of these vessels being built, 389 of 1,266,164 tons are under the inspection of the Surveyors of Lloyd's Register with a view to classification by this Society.

The total number and tonnage of vessels now under construction in some of the principal shipbuilding districts of the country, for the quarters ended 30th September, 1914, 30th June, 1914, and 30th September, 1913, are as follows:—Barrow, Maryport and Workington, September, 1914, 4 vessels, 2685 gross tons; June, 1914 (5), gross tons 9,726; September, 1913 (6), gross tons 10,047. Belfast, September, 1914 (28), gross tons 351,350; June, 1914 (26), gross tons 296,350; September, 1913 (27), gross tons 324,640. Glasgow, September, 1914 (100), gross tons 410,118; June, 1914 (95), gross tons 433,575; September, 1913 (107), gross tons 496,385. Greenock, September, 1914 (46), gross tons 203,880; June, 1914 (49), gross tons 229,710; September, 1913 (58), gross tons 287,320. Hartlepools and Whitby, September, 1914 (17) gross tons 79,880; June, 1914 (19), gross tons 85,406; September, 1913 (19), gross tons 81,502. Hull, September, 1914 (51), gross tons 31,508; June, 1914 (44), gross tons 26,367; September, 1913 (53), gross tons 37,410. Liverpool, September, 1914 (14), gross tons 35,304; June, 1914 (17), gross tons 48,419; September, 1913 (15), gross tons 54,960. Middlesbrough and Stockton, September, 1914 (39), gross tons 69,258; June, 1914 (42), gross tons 82,504; September, 1913 (35), gross tons 100,973. Newcastle, September, 1914 (67), gross tons 302,831; June, 1914 (66), gross tons 285,157; September, 1913 (66), gross tons 297,250. Sunderland, September, 1914 (51), gross tons 191,064; June, 1914 (45), gross tons 172,103; September, 1913 (55), gross tons 236,450.

McLEAN'S 2A CLASS DECKED LIFEBOAT.

To fulfil the new requirements of the Board of Trade resulting from the International Convention on Safety of Life at Sea, Messrs. Hugh McLean & Son, boat builders, Ure Street, Govan, have designed and patented a modified form of the decked lifeboat which they have produced in great numbers of late for the Cunard Company and other ocean lines of steamships, an illustrated description of which appeared in our issue for December last year. This modified form is a boat of the 2A Class, and is illustrated herewith, loaded with 60 adults on board, when undergoing tests as to strength, stability, trim, freeboard rowing, etc., in Meadowside Dock, Glasgow, in July this year. The result of these tests, it may at once be said, proved highly satisfactory in every respect, and the Board of Trade, from their surveyors' reports of the tests, promptly granted their full approval to this type and make of lifeboat. The works of Messrs. McLean and Son, at Govan, have ever since been taxed to the uttermost fulfilling the orders received from several of the principal ocean lines.



McLean's Decked Lifeboat 2A Class undergoing rowing test. Sixty adults aboard.

In general appearance the 2A Class of McLean decked lifeboat differs little—at a casual glance at least—from the earlier make of boat illustrated in our pages, and of which hundreds are in use on ocean liners. Like the earlier boat, the new type is 30 ft. long by 9 ft. beam and 2 ft. 6 in. depth to gunwale, but essential differences consist in the sunk well being extended the full depth of the boat and metal air casings take the place of structural watertight subdivision and freeing valves of the National Lifeboat Institution pattern. The reason for this modification mainly consists in the fact that in boats decked all over, and with the divisionary bulkheads localizing any ingress of water, the danger due to such leakage is not apparent until perhaps too late to combat it, and to overcome the sudden change of trim by bailing or pumping out the water. In the Class 2A McLean boat the bulkhead system of framing is still maintained, but all the bulkheads are efficiently limbered, and with the open well any necessity for bailing is at once as apparent as in the ordinary standard open lifeboat. Freeing valves are not provided nor necessary. Greater buoyancy than in any other type of boat is provided in the shape of metallic air cases. The excess in this respect is equivalent to 1·5 cub. ft. per adult carried, while, in addition, ·2 of a cub. ft. per adult is provided in outside solid cork buoyancy.

All the advantages due to structural design and general arrangement distinguishing the earlier type of the McLean lifeboat have been maintained in the newer form. Owing to the retention of the bulkhead system of framing, strength is still a marked feature. At the tests on the 30-ft. boat the temporary deflection with 25 per cent. in excess of the full load—and weight of boat—on board was only $\frac{9}{16}$-inch in the 30 ft. The planking is of two skins of mahogany with painted calico between, and in all tests carried out not a leak was observed.

The arrangement of folding topsides is as before, consisting of a solid wooden bulwark along the straight of the boat's side, with the minimum amount of canvas at the ends. The wooden bulwark allows of chocks being fitted, whereby two boats, one on top of the other, can be stowed securely without entailing, on the part of the shipbuilders, any chocking for the top boat. Erecting the topsides has been officially timed by the Board of Trade to occupy only 15 seconds by two men, while the raising of all the thwarts into secure position is effected in one motion. The seating accommodation is such as to allow the passengers comfort on the side deck surrounding the well, thus having the shelter of a 2-feet bulwark, the rowing party alone occupying the thwarts. With the load thus disposed, the resultant centre of gravity is very low, and a surprisingly large angle of inclination is possible with safety. The freeboard of the 30 ft. boat in the load condition is 2 ft. 10 in. from top of folding bulwark to water-level at midships, thus meeting the Convention requirements in this as in other respects.

Evidence of the popularity of the McLean 2A Class boat with shipowners is apparent from the very large number the builders have in hand at the present time. One reason for this may be found in the fact that the trouble and responsibility of surveying and certifying the boats during service are no greater for marine superintendents and Board of Trade officers than in the case of ordinary open lifeboats. In boats with water-tight decks and watertight built-in compartments there is, of course, greater uncertainty as to satisfactory internal conditions, and difficulty in rectifying what may be amiss.

Messrs. Suter Hartmann & Rahtjen's Composition Co.—In a paragraph relating to this Company published in our October issue, the impression was given, owing to a printer's error in transposing a line of type, that the compositions and paints of the Company had only been manufactured at Silvertown during the last twelve months. This of course is incorrect, the specialities of the Company, which, by the way, is entirely under British control, having been manufactured in England continuously for the last forty years.

BOILER EXPLOSIONS.

THE Board of Trade has just issued a report of enquiries held under the Boiler Explosions Acts, during the year ended 30th June, 1913. During this period sixty-six preliminary enquiries and fourteen formal investigations were held. Of these eighty explosions, forty resulted in loss of life or personal injury, thirty-one persons being killed and forty-two injured. The thirty-one deaths were caused by twenty explosions, of which eleven occurred on land and nine on ships. The number of persons killed was above the average (26·51) for the thirty-one years since the act came into force, but the number of injured is considerably below the average. It is satisfactory also to be able to record a drop in the number of explosions which occurred during the period, though this is slightly above the average (72·9). An important point to which the Commissioners draw particular attention is the necessity for urging upon the attention of users of small boilers how essential it is that these boilers should undergo periodic "thorough" examinations. By an analysis of the figures in the report, it is shown that in no fewer than twenty-seven cases there had been no inspection by any competent person for several years before the explosion. Another recommendation by the commissioners is that all owners of steam trawlers should be warned of the danger attending the use of loose fitting valve seatings, unless they are under the control of a master valve interposed between the check valve and the boiler. Classifying the causes of explosions we find that deterioration or corrosion was responsible for twenty-four explosions; defective design or undue working pressure accounted for thirteen, waterhammer action for eleven; defective workmanship, material or construction for sixteen, while ignorance or neglect of attendants caused eight explosions; nine were due to miscellaneous causes. A table in the report shows that since the passing of the Acts (1882) 2,260 explosions have occurred resulting in 820 lives being lost and 1,803 persons receiving injuries.

NEW P. & O. MAIL STEAMER.

THE P. & O. Company's new steamer *Kaisar-i-Hind* (*Emperor of India*) so named in commemoration of the visit of their majesties the King and Queen to India in connection with the Imperial Durbar of 1911-12 (at which time the vessel was projected) left Tilbury Dock on 24th October on her maiden voyage, with Bombay as her destination. She has been constructed at the yard of Messrs. Caird and Co. of Greenock; is of 11,430 tons gross register with a length of 520 feet; breadth 61 feet; depth, amidships, 38·3 feet and is driven by two sets of quadruple-expansion reciprocating engines developing 16,000 horse-power. While she embodies the general design of recent steamers of the "M" class her internal planning presents a further development of this favourite type among P. & O. steamers; and, being intended more especially for the Company's mail and passenger services between London, Marseilles and Bombay, all her arrangements are made to meet that particular trade.

In the first saloon cabins upper berths are almost entirely absent; most of the cabins contain only two berths, and there are besides numerous single-berth cabins. A large majority of the cabins are furnished with cot bedsteads, wardrobes, writing tables, etc., and for each bed throughout the ship there is provided a portable reading lamp; the free provision also of an electric ventilating fan in each cabin will be appreciated. The passenger cabins include *en suite* accommodation in the shape of cabins-de-luxe and bedrooms with bathrooms attached. Water is laid on to all cabin lavatory basins throughout the ship. Altogether there is accommodation on five decks for 315 first and 233 second saloon passengers.

The sixth and uppermost deck, the boat-deck, will, while intended for general use, be of especial value to passengers as an observation deck. Beneath the boat-deck, sheltered promenade wing decks, flanking the music saloon and a double range of cabins, extend throughout the midship length of the vessel. On this level also is situated the first-class smoking saloon, a handsomely designed appartment with a glass domed roof, including among its comfortable appointments lounge seats, card tables, electric punkahs, etc., while, at the after end, access is had to an open-air verandah. Abaft the after well, this deck is continued as an awning covered promenade poop-deck of considerable area for the enjoyment of second-saloon passengers. Below, on the hurricane and promenade decks respectively, are the second-class music and smoking saloons and the second dining saloon, all comfortably furnished, well ventilated and spacious.

The first dining saloon is situated forward of the midship section on the upper deck, with a seating capacity for some 300 passengers and, like the second-class dining saloon, extends through the width of the ship. This saloon, in common with the ships' other public apartments, has been constructed internally from the designs of Mr. T. E. Collcutt, with mural decorations and empanelled frescoes by Professor Moira; it is approached from the decks above and below by a handsome companion staircase and is lighted from the sides by twenty-two large circular port-holes and from above by an oval well which rises through the music saloon and it is continued to the promenade deck, where it terminates in a large stained-glass dome, in the ends and sides of which Professor Moira's pictures are placed. The music saloon is extensive and lofty, the rich but quiet tones of its furniture and carpets and its recessed writing tables giving it an air of repose; while at the after end, next the companion, communicating with other decks, are the cabinets containing the ship's library. The luxuriously furnished divan or smoking lounge, immediately abaft the music saloon, is more spacious than in recent steamers of the "M" class and has a sufficiency of corners and bridge tables. On the main deck is the children's saloon or play room. For the service of passengers requiring, during the voyage, care at the hands of the ship's surgeon, dispensary and hospital cabins are fitted up in accordance with the latest practice.

The *Kaisar-i-Hind* has an electric laundry capable of dealing, *en voyage*, with passengers' needs in the matter of fresh linen and is fitted with a powerful installation of wireless telegraphy on the Marconi system in charge of skilled operators. At the disposal of the purser's department is a modern refrigerator plant with considerable storage capacity ensuring an ample supply and variety of fresh table provisions during the voyage. The first and second saloon galleys are moreover fitted with up-to-date electrical devices as adjuncts to the services of the culinary staff.

THE KJELLBERG PROCESS OF ELECTRIC ARC WELDING.

A VERY interesting catalogue has recently been issued by The Anglo-Swedish Electric Arc Welding Co., Ltd., the Company which for a considerable time past has been successfully operating the Kjellberg patents. The Kjellberg process is a Swedish one, and we are informed that the firm has no connection with Germany, and no Germans are employed by them. The catalogue gives an interesting short account of the history of electric welding and tells how Mr. O. Kjellberg, after experimenting with the process of a Russian engineer named Slavianoff, succeeded in 1902 in bringing his own process to such a state of perjection that he was able to carry out important boiler repairs with highly satisfactory results. It is for boiler work that the Kjellberg process is largely used. In such work it is usually essential that the work be completed in the most efficient manner and in the shortest possible time, since in the majority of cases the fact that the part to be repaired is out of commission means that a steamer or other valuable plant cannot be used until the repair has been effected. If we consider the case of a steamer in which it has been found that a crack has appeared in one of the furnaces or other part of the boiler, or that leakage or corrosion at the landings or rivets has become so serious as to demand immediate attention, it might be necessary in the ordinary way to lay up the vessel for repair, but by the aid of this welding process the work can be carried out while the steamer is discharging and loading, and consequently considerable economy is effected. A number of jobs are illustrated in the catalogue, but as examples of repairs actually carried out within a day, mention may be made of a repair in less than one working day of a crack about 4 ft. long in the furnace flange of the front end of a boiler; the building up of a corroded manhole flange in a few hours; the welding in of a piece of plate 9 in. by 10 in. at the inner end of a corrugated furnace crown in about half a day, etc. The process is also very useful in many manufacturing operations, as it can be used for welding flanges and branches to large steel seam pipes, for filling blow-holes or remedying defects in steel castings of all kinds, for the manufacture of small seamless boilers and in general of tanks and vessels of all kinds. During the period the Kjellberg process has been in operation on a commercial scale, thousands of boilers have been repaired with highly satisfactory results. Practically the whole of the Company's work has to pass the inspection of the Board of Trade or the classification societies. Copies of the catalogue, which is well illustrated, may be obtained from the Company's offices at Wood Wharf, Greenwich.

The Beldam Packing and Rubber Co., Ltd.—It is worth recording that approximately 25 per cent. of the employés of the above firm have responded to their country's call to arms, and arrangements have been made to guarantee re-instatement of these men on the expiration of the war, also half pay to the wives of married men and suitable provision for the dependants of single men during the war. In the meantime orders are being promptly executed, and stocks maintained with all agencies abroad unaffected by the war. This firm, which was established in 1876 by the late Mr. Asplan Beldam, M.I.N.A., M.I.M.E., M.I.Mar.E., has recently been turned into a limited liability company, all the shares being held by Messrs. G. W. Beldam and C. A. Beldam, sons of the founder. The works at Brentford (Middlesex) have been considerably extended of late years, owing to the largely increasing demands for their packings, jointings, etc., which are all of British material and manufacture.

BOILERS AND BOILER PARTS.

Supplementing the pamphlets issued by the Intelligence Department of the Board of Trade, relating to the possibilities of new trade openings in countries hitherto drawing their supplies from Germany and Austria, is one, showing the latter countries' exports to all destinations, of boilers and boiler parts.

Germany during 1912 exported the following :—

	£
Locomotive boilers and portable steam engine boilers of malleable iron	35,500
Other steam boilers of malleable iron with more than ten similar tubes of a diameter of 300 mm. or less	190,500
Steam boilers of all kinds of non-malleable cast iron	6,950
Single parts (spare and duplicate parts, etc.) for steam boilers and steam drums	36,000
Other steam boilers and steam drums of malleable iron	89,750
Mooring drums (buoys), gas and other reservoirs, receptacles, utensils, boilers (other than steam boilers) of malleable iron for factories, etc., riveted, pressed, welded and composite parts thereof	372,050
Tube joints and fittings of malleable iron for steam boilers, steam drums, reservoirs and similar apparatus, etc.	426,400
Total	£1,157,150

From Austria-Hungary during 1913 the following were exported :—

	£
Wrought-iron boilers, forged, riveted, pressed	1,215
Steam boilers ready for use, with or without the fittings, belonging thereto and fitted thereon	8,860
Cisterns and tanks ready for use, with or without the fittings belonging thereto and fitted thereon	18,810
Boilers of base metals and alloys thereof; moulds merely hollowed out; forged or rolled boiler ends and fire-boxes; iron casks, etc.	8,250
Total	£37,135

The complete particulars of the exports of the United Kingdom of similar goods are not available. Boilers, however, to the value of £1,773,200 were exported to all destinations in 1913, but similar details of other descriptions of boilermakers' wares are not separately recorded in the trade returns of the United Kingdom.

The following statement shows for a recent year the value of the under-mentioned descriptions of boilers, etc., exported from Germany and Austria-Hungary to the United Kingdom, and thus gives a measure of the German and Austrian competition our manufacturers have to meet in the home market. Compared with our home production of these goods, which, according to the final report on the first census of production, amounted to not less than £4,250,000 in 1907, the German and Austrian figures are insignificant.

From Germany, 1912.

	£
Steam boilers, other than locomotive boilers, of malleable iron with more than ten similar tubes of a diameter of 300 mms. or less	1,700
Single parts (spare and duplicate parts, etc.) for steam boilers and steam drums	450
Other steam boilers (except locomotive boilers) and steam drums of malleable iron	250
Mooring drums (buoys), gas and other reservoirs, receptacles, utensils, etc., of malleable iron for factories, etc., riveted, pressed and welded; also composite parts thereof	33,300
Tube joints and fittings of malleable iron for steam boilers, steam drums, reservoirs and similar apparatus, etc.	8,950
	£44,650

From Austria-Hungary, 1913.

	£
Wrought-iron boilers, forged, riveted and pressed	20
Cisterns and tanks ready for use, with or without the fittings belonging thereto and fitted thereon	35
Iron casks	20
	£75

REPAIR SHIPS AND THEIR DUTIES.

It is only within recent years that naval repair ships have been regarded as essential factors in the composition of a fleet or flotilla. Their proved usefulness, however, has shown the necessity for their adoption, and great care and attention is now being paid as regards their design and equipment by all the leading naval powers. Warships of whatever type or design must possess two great characteristics: firstly, economy in using and capacity for stowing fuel, so as to give the maximum "radius of action," and secondly, ready means of repairing ordinary defects at sea without the necessity of returning to a dockyard for making good such defects. In some of the earlier repair ships the comparatively crude workshop machines fitted mitigated against full advantage being taken of these vessels, but with the advent of the present highly efficient workshop engines and fittings, and the utilization of electricity as the motive power, the limitations of the repair ships have to a great extent been eliminated, and in spite of the many disadvantages which must of necessity obtain in a floating workshop, the work undertaken and successfully negotiated by the repair ships compares very favourably with similar engine and hull repairs effected by the Royal Dockyards. The type of repair ship must of necessity depend upon the particular fleet or flotilla to which she is attached, as the class of work undertaken differs so materially. The types adopted by the great naval powers may be divided broadly into three classes:—

H.M.S. *Hecla*, Repair Ship and Special Torpedo Ship.

(*a*) Battle-fleet repair ships. These vessels are capable of undertaking the largest repairs and accompany the battle fleet to sea.

(*b*) Destroyer repair ships. These vessels effect all repairs to torpedo boat destroyers and torpedo boats, and are of a much lighter type than the battle fleet repair ships.

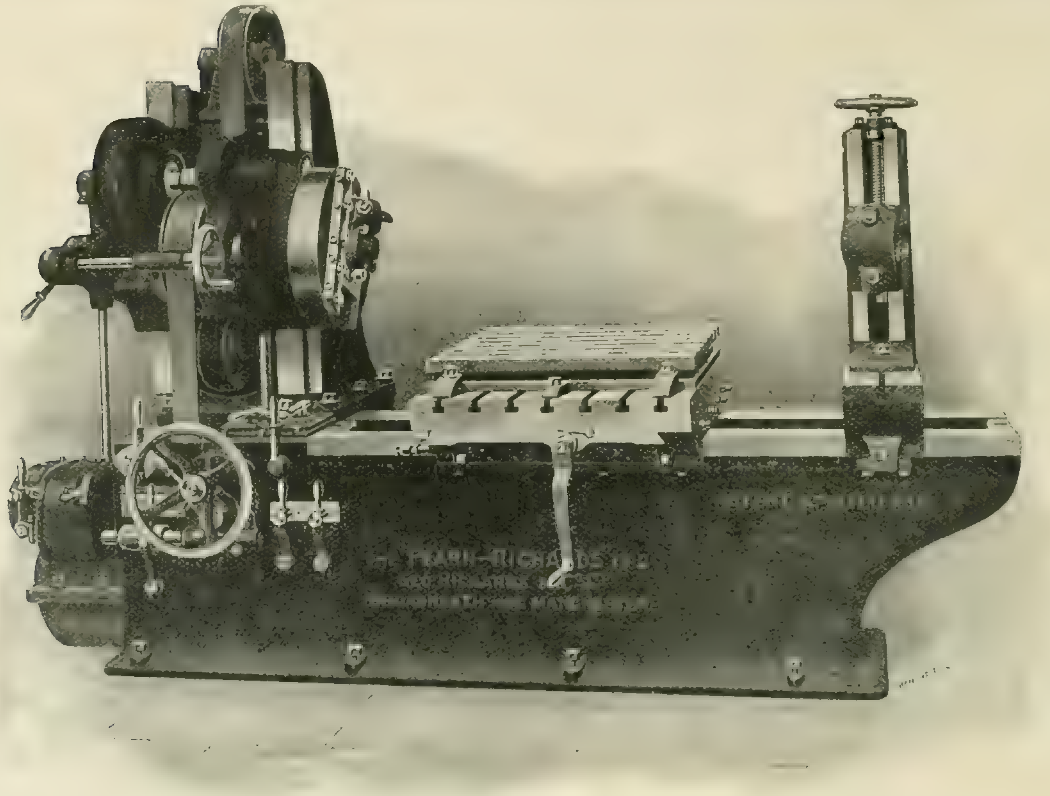
(*c*) Submarine repair ships. In this case very light workshop machinery is fitted, as the repairs undertaken are comparatively small.

Before discussing the disposition of the various workshop engines, it is interesting to note the type of vessel adopted for each particular service. For the battle squadron the repair ship must be very large, and capable of negotiating the largest defect which might develop in a battleship or battle-cruiser. Speed in this case is, of course, a secondary consideration, but space for the various workshops, etc., is of primary importance, and the vessel must be fitted with efficient cranes, etc., for the rapid transportation of large machinery parts to the respective workshops. The modern battle fleet repair ship should be capable of undertaking castings up to two tons in weight. Piston rings up to 80 inches in diameter can be cast and machined, and stop-valve boxes up to 12 ins. diameter are frequently negotiated. Although engine defects are the primary consideration, defects of the gun mechanism have frequently to be made good, and turret defects which would necessitate return to a dockyard can be made good by a repair ship in one or two days. The repair ship for torpedo boats and destroyers is of quite a different type, and in this case the repair ship has to accompany the flotilla to sea and also be capable of moving rapidly from base to base. The usual method is to convert a fast obsolete cruiser, but in view of the growing importance of the destroyer repair vessels, a new type is being evolved combining speed and workshop space.

The submarine repair ship is of a much lighter type, the work executed being so much finer. Although several light cruisers have been converted for this particular duty, several specially constructed ships are now in commission, and have proved the wisdom of the adoption of a special type for this particular duty.

In all repair ships the arrangement of the various machines is of primary importance if the most efficient results are to be obtained, and the various Admiralties spare neither expense nor thought in adopting the most up-to-date labour-saving appliances. Although much depends upon the knowledge and skill of the officers and mechanics of the engine room department, still more depends upon the reliability of the various machines employed, the class of work turned out, and the repairs undertaken and successfully carried through, proving the efficiency of the various workshop engines fitted. An important point in connection with the workshop machinery is the installation of a separate electrically-driven air compressor for supplying air to various branches throughout the ship. This apparatus is chiefly intended for the supply of air to pneumatic tools, such as hammers, chisels, etc., and enables the air service to be led to a damaged boat alongside. For under-water repairs, such as frequently arise during manœuvres, this separate air supply is a great asset

H.M.S. *Cyclops*, Repair Ship, Battle Fleet.

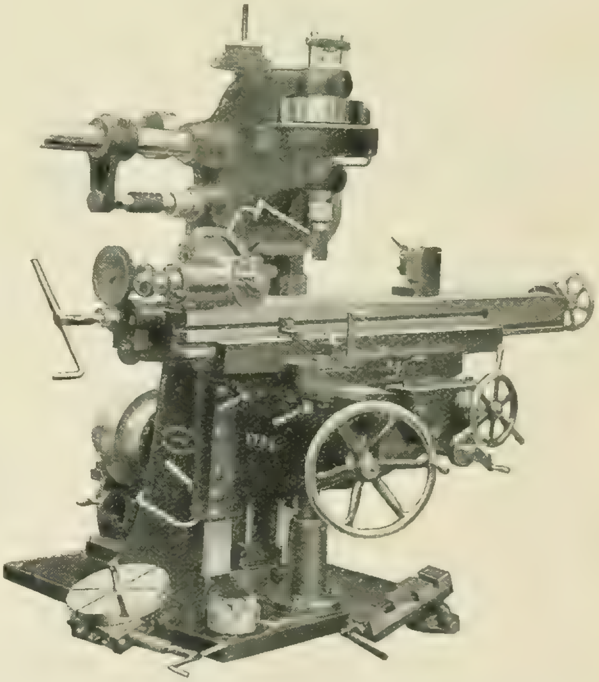


The "Pearn-Richards" High-speed Combined Surfacing, Boring, Milling and Drilling Machine (Messrs Geo. Richards & Co., Ltd., Broadheath)

to the diver mechanics, the necessary repair being easily and rapidly carried out with the minimum amount of labour. A great point with the separate air compressor is that even were steam shut down for any cause in the repair ship, electric leads could be led across from another ship or boat and the necessary air supplied for the pneumatic tools.

General Arrangement.

The turnery and fitting shops are arranged for on the main deck, the vice benches being fitted under the ports, and the various machines in central positions. All machines are provided with efficient adjustable stays to prevent movement in rough weather. In all floating workshops "drive" is a most important factor, as head room is usually materially reduced, and the question of efficient drive needs the most careful consideration. In many cases jockey pulleys are adopted, and patent flexible belting is fitted to obtain the maximum "grip." The heavy machines are fitted with separate motors, but in the small fitting shop two motors are usually fitted, each of which is capable of driving the whole of the light machines, and thus chance of complete breakdown is greatly minimised. In all modern repair ships extra dynamo engines are installed, so that a complete failure of the electrical system is rendered a practical impossibility. The lathes fitted vary in size to suit the different requirements, the 21-inch centre triple geared sliding and surfacing machine being the largest installed. Double geared sliding, surfacing, and screw-cutting machines from 6 to 15-inch centres are adopted for ordinary



Universal Milling Machine by Messrs. Wm. Muir & Co., Ltd. (Manchester), as fitted in several repair ships.

repairs, and Pittler lathes are fitted for small work. Turret lathes are now being introduced in repair ships, and are a valuable asset to the workshop equipment. One of the most useful machines adopted is the universal turning, boring, drilling, screw-cutting and milling combination, made by Messrs. Drummond Bros., an endless variety of work being successfully undertaken. Another type of machine is the universal miller with horizontal and vertical spindles, by Messrs. William Muir & Co., Ltd., and a facing and boring machine by Messrs. George Richards & Co., Ltd. Band saws are fitted for light work, such as cutting up boiler tubes, etc., and for the heavy metal sawing, saw benches are fitted.

(To be continued.)

TECHNICAL SOCIETIES.

N.E.C. Inst. of Engineers and Shipbuilders.—The session 1914-15 has commenced, and meetings have been arranged for Oct. 30th, Nov. 27th, Dec. 18th, Jan. 29th, 1915, Feb. 26th, March 19th and April 30th.

N.E.C. Inst. (Graduate Section).—The session opened on Oct. 31st, and during the term the following papers will be read :—Nov. 21st, "Lighthouses and Lightships," by Mr. C. Suckan ; Dec. 12th, "Stability," by Mr. P. Y. Brimblecombe, M.Sc. ; Jan. 30th, "Notes on Ship Resistance," by Mr. A. P. Patterson ; Feb. 27th, "Electric Lighting and Power for Ships," by Mr. O. Holmes ; March 27th, "Broadside Launching," by Mr. E. L. Champness, B.Sc. ; April 24th, "Elements of Navigation," by Mr. M. M. Parker, B.Sc:

Inst. of Marine Engineers.—Meetings have been fixed for Nov. 9th, when Mr. John Tait will read a paper on "The Circulation of the Scotch Boiler, and how it may be improved;" Nov. 16th, "Discussion or Fuel Test." On Dec. 14th, a paper on the "Steering Gear" will be read by Mr. Leigh Martineau. "Terrestrial Magnetism" was the subject of a paper read by Mr. A. N. Sommerscales (member) on the 19th of October.

Association of Engineers-in-Charge.—The presidential address was delivered on Oct. 14th by Mr. Frank Bailey, who took for his subject "The British Empire and our work in it."

Junior Inst. of Engineers.—The Council has elected the most Hon. the Marquess of Graham as the president for the year 1914-15 in succession to Sir Boverton Redwood, Bart. The Vickers Prize, consisting of a gold medal and premium of instruments or books, has been awarded to Mr. James Richardson, B.Sc., for his paper on "High-power Diesel engines and their development for marine service."

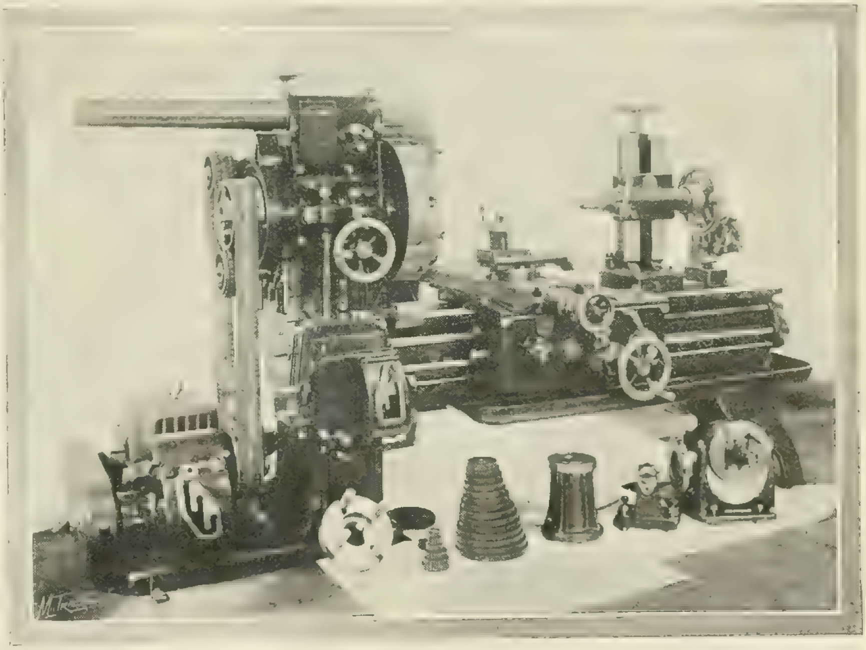
Manchester Association of Engineers.—On Nov. 24th adjourned discussion on the paper "The Education of Engineers" will take place. The following papers will be read :—On Dec. 12th, "Some points in jig-making," by Mr. Max R. Lawrence ; Jan. 9th, "Behaviour of metals under Stress," by Mr. F. C. A. H. Lantsberry ; Jan. 23rd, a joint paper by Messrs. Pilling and Frank Foster, "Essential Principles of Engine Design and Choice of Materials ;" Feb. 27th, "Notes on Modern Ironfounding," by Mr. R. Onions. On March 13th, the report of the Tool Steel Research Committee will be presented.

Inst. of Mechanical Engineers.—On Oct. 30th the "Thomas Hawksley" lecture was delivered by Mr. Wm. B. Bryan, member, on "Pumping and other machinery for waterworks and drainage." Meetings have been arranged for Dec. 18th, Jan. 22nd, Feb. 19th, March 19th and April 23rd.

Inst. of Engineers and Shipbuilders in Scotland.—At the time of going to press, we learn that the programme of the forthcoming session is as follows :—Mr. R. T. Moore delivers his presidential address on October 27th, after which two papers will be submitted, one by Mr. W. D. McLaren on "Geared Turbines for Ship Propulsion," and the other by Mr. John Tait on "How the efficiency of the Scotch boiler can be improved." Other papers to be read and discussed during the session are "Experiments on the Gyroscopic control of torpedoes, submarines and airships," by Mr. James Gray, D.Sc. ; "Safety valves," by Mr. D. MacNicholl ; "Experiments on the influence of Indicator connection pipes," by Mr. Thomas B. Morley, B.Sc. "The compressive and flexural properties of a series of Scottish building and road stones," by Mr. Robert Boyle, B.Sc. ; "Some notes on heat transmission and efficiency of boilers," by Mr. Robert Royds, M.Sc. ; "A modern system of heating, ventilation and hot-water supplies as applied to the mercantile marine," by Mr. David M. Nesbit ; "The design and equipment of the Clyde Trustees' new granary at Glasgow Harbour," by Mr. George H. Baxter.

Messrs. Ronald Trist & Co., Ltd.—This progressive concern, which already does an extensive business in engineering specialities, has now added to its operations, a machinery export department which will be under the management of Mr. George A. Goodwin, M.I.C.E. This department will act as a buying agency, will invite tenders, place orders and supervise the construction of work in the manufacturer's shop. The department will also be ready to enter into approved agreements to finance orders, subject to the usual references. Indents and contracts will receive Mr. Goodwin's personal attention.

Fire Patrols for Factories Engaged on Government Work.—The British Fire Prevention Committee desire it to be known that a certain number of reserve firemen (over thirty-five years of age) of good character and experience, are available from the Committee's Special Fire Service Force, to do either part time or full time watch or patrol service on factories and works engaged upon Government emergency orders. Applications should be addressed to the Registrar, British Fire Prevention Committee, 8, Waterloo Place, London, S.W.



The "Drummond-Barreto" Universal Turning, Boring, Drilling, Screw-cutting, Milling and Gear-cutting Machine (see Repair Ships). (Messrs. Drummond Bros., Guildford.)

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our Own Correspondent.)

State of Industries.—Generally speaking, the shipbuilding and marine engineering branches of Clydeside industry are continuing to exhibit a satisfactory state of activity. In those establishments where naval work is underway—and as indicated in previous notes, the Clyde has seldom been better off in this respect—operations are carried on practically day and night. The arrangement made between the Clyde Shipbuilders' Association and the different Trades Unions for the unrestricted transfer of men from yards where only merchant ships are on hand to those yards where naval work is paramount and pressing, continues to work exceedingly well. The position of those shipbuilding firms, however, who at the time of the outbreak were building steamers for Germany and Austria, as well indeed as for countries not actively involved in warfare, has not improved as time has gone on. Port Glasgow yards are specially affected and operations on many of the vessels have slackened off and in some cases absolutely stopped. Builders finding themselves thus situated—and some independent marine engineering firms are equally involved—have been advised by British insurance companies to proceed with the work at normal pace; or more rapidly if advisable, and sell the vessels at the best figure possible, debiting the Germans or Austrians with any serious loss they may sustain.

Launches and Completions.—During October, as far as the month has gone at the time of writing, there have been few vessels sent off the stocks. The output will fall very short of that for September, which reached the high total of 56,840 tons.

New Contracts.—The Clyde, like other building centres, is receiving due share of the naval contracts being at present given out by the Admiralty, although nothing definite is allowed to transpire. The following are orders for mercantile tonnage booked since our last month's notes were written:—Messrs. A. Stephen & Sons, Linthouse, a large passenger and cargo steamer for the Australian service of Messrs. Shaw, Savill & Co.; Messrs. William Denny & Brothers, Dumbarton, a cross-Channel steamer for the London and South-Western Railway Co.; Messrs. Ritchie, Graham & Milne, Whiteinch, a stern-wheel steamer, a lightship and a barge; Messrs. Fleming and Ferguson, Paisley, a self-propelling bucket-dredger for the North British Railway Co., and intended for service in the harbour of Bo'ness; Messrs. McKie & Baxter, Copland Road Engine Works, Govan, a steamer of 250 tons carrying capacity for Cape Verde Island water carrying, the hull for which has been sub-let to Messrs. George Brown and Co., Greenock; and the Caledon Shipbuilding Co., of Dundee, a high-class passenger and cargo steamer of 320 ft. length for Messrs. Yeoward Brothers, Liverpool.

Shipbuilding and Repairing at Ardrossan.—Extensive additions and improvements are at present being carried out at the dockyard and works of the Ardrossan Dry Dock and Shipbuilding Co., Ltd., more particularly with a view to specializing in the building of coasting vessels. The control of the business, which twelve months ago was centred in Sunderland, has recently been, by a transference of shareholding, centred on the Clyde. Mr. Hector M. McNeal, of Glasgow, has been elected chairman of directors; Col. D. Hamilton, of Glasgow, and Mr. E. Aitken-Quack, formerly with Messrs. H. & C. Grayson, Liverpool, and general manager for Messrs. Clover, Clayton & Co., Birkenhead, will act as managing directors. To bring the works more up-to-date, new rolls, punching and planing machines, etc., have been laid down, and in the course of the next few months hydraulic riveting, flanging and joggling machines will be installed. Additional ground has been leased adjacent to the works with a good sea frontage, and on this has been erected new joiners' and carpenters' shops, also spar-making and boat-building sheds. For driving the machinery here a suction-gas plant has been laid down. Plans are out for a new engineering shop for repairs, which will be fitted with a large number of new machine tools, driven electrically. At present the yard has four building berths and a fifth is in course of construction, while developments are foreshadowed which at a moderate cost will give two further berths.

THE TYNE AND WEAR.

The Tyne.

(From our Own Correspondent.)

THE business of shipbuilding on the Tyne is probably more brisk than at any other time in the history of the river; only as so much of it—the greater part of it indeed—is concerned with the work of the Admiralty nothing can be published. The firms which are so busily and proudly engaged in adding units to the Navy are compelled to hide their light under a bushel, and instead of announcing their successes have to just push along with the work in hand and turn it over without the usual attendant ceremonies which constitute in this neighbourhood so important a part in the life of the industrial community. At the great yards at Elswick, the new yard at Walker and at Jarrow, Hebburn and St. Peters, there is the most intense activity. All classes of the workers are uniting with a keen determination to keep Britain to the front.

The success of the Navy in keeping open the communications by sea has had a powerful influence on the work of building cargo steamers. This department has, of course, suffered materially by the withdrawal of men to take up Admiralty work, but in the long run all this has helped to keep work continuous all over the district. Where work has ceased on certain bottoms it has been compensated by the engagement of the diminished staffs on other cargo boats, and when the war is over—though that is perhaps a long way to look ahead—there is sure to be once more a surplus of orders for the shipbuilding centres.

Shipbuilders in any case intend to be prepared for extending business. Messrs. Swan, Hunter & Wigham Richardson and Co. have opened a new graving dock. It is 495 ft. long and 70 ft. wide with a depth of 24 ft. of water on the sill. The contractors were Messrs. McAlpine & Sons, of Glasgow, and Messrs. Swan, Hunter made the dock gates themselves. It has taken eighteen months to build and that is said to be a record for a dock of this size. The dock adjacent has been lengthened by 25 ft., giving a total length of over 500 ft.

There are also to be very important developments over the river at Messrs. Palmer's. This has been a good year for Palmer's Shipbuilding Co., and has gone a long way to make up the disastrous arrears of the previous year. The Company, however, feels itself sadly hampered by some obsolete plant, and intends very shortly to lay in a complete installation of new plant at a total expenditure of something like a quarter of a million before all the plans projected by the directors are accomplished.

Messrs. William Dobson & Co., of Walker, have booked an order for a small cargo steamer.

Messrs. Palmer's Shipbuilding Co., Jarrow, are going to build on the Isherwood principle an oil-carrying steamer of 15,000 tons for the Anglo-American Oil Co., London. Her propelling machinery will consist of quadruple-expansion engines.

The new dry dock for Messrs. Baird, Bros., Ltd., of Bull King, North Shields, was opened on the 14th October. It is fitted with three sets of blocks to enable three drifters or two small coasting steamers to be docked together. The dock is 160 ft. long and 45 ft. wide, with a depth on sill of 21 ft. at ordinary spring tides.

The Wear.

The yards which are engaged on Admiralty work on the Tyne are still being fed with men from the Wear and other parts of the north-east coast. Numerous as have been the arrivals more men are still being advertised for widely for all departments of shipbuilding work. Consequently there are very many less men employed on the Wear; there is no scarcity of work for those who remain.

Messrs. William Pickersgill & Sons, of Sunderland, are engaged on a collier of 2,500 tons for Messrs. Ridley, Son, and Tulley, of Newcastle.

Work is proceeding steadily, if slowly, at most of the yards on the Wear.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

Port of Hull's Trade.—We should be very grateful to our Navy for the manner in which they are keeping the seas clear of the enemy's ships. Owing to the Navy's excellent work the trade of the port of Hull is extremely good, taking into consideration the state of the times, and vessels are arriving from all parts of the world with their cargoes, discharging their valuable foodstuffs in safety, and placing into work a large number of dockers. A number of continental steamers are laid up, which means a considerable loss, but the men apparently are being shipped on other steamers using the port. The coasting steamers keep well employed and the coal trade is well maintained. Several large vessels have arrived from the distant ports of Australia, New Zealand, the River Plate and India. The floating mines have been the cause of bringing a number of Grimsby trawlers to grief, but a large number of trawlers are engaged in clearing the North Sea, as far as possible, of these deadly instruments of destruction.

The engineers, boilermakers and shipbuilders on the Humber are very busy building new vessels, etc., and the shops have plenty of repair work from ships visiting the port. The fishing vessels keep coming in, and sometimes with record catches of fish from Iceland and the North Sea.

Mr. J. A. Sturrock, who has just retired from the position of shipyard manager at Messrs. Earle's Shipbuilding and Engineering Co., Ltd., Hull, after holding the position for a period of ten years, has joined Mr. Ohlson's (the sheriff of Hull) steamship agency, as managing director. This is a new company with offices in this city and also in Sweden. Two smoking concerts were arranged in Mr. Sturrock's honour and took place at the Grosvenor Hotel, Hull, one by the shipyard employés on the 19th September, and the other by the boilermakers on the 6th October. Several influential gentlemen attended these functions and Mr. Sturrock was the recipient of a number of presentations. The shipyard employés gave a gold watch and chain, suitably engraved, and the boilermakers' gift took the form of a marble clock and bronzes, and a table centre for Mr. Sturrock, and a watch bracelet for Mrs. Sturrock. At both concerts Mr. Sturrock was enthusiastically received, and in acknowledging the gifts, remarked that he appreciated the same, not because of their magnitude, which was great, but because he felt that they were accompanied by the best wishes of all who had been associated with him as shipyard manager for the past ten years.

MERSEY AND MANCHESTER SHIP CANAL.

(From our Own Correspondent.)

Messrs. Cammell, Laird & Co.—Many employés of this firm took an active part in the recent good work performed by the Naval Division at Antwerp. Amongst them might be mentioned Lieut. G. Daglish, late engineering manager of the repair department; Sub-Lieut. H. Bremner, of the engineering staff. In the fitting-out basin, besides the geared turbine steamers for the South American service of Messrs. Mihanovitch, is the P. & O. steamer *Kalyan*, which was successfully launched on September 24th. Great activity, of course, prevails upon Admiralty work, the whole staff and employés from the firm's esteemed managing director, Mr. G. J. Carter, downwards, are just now doing yeoman service to the country. Mrs. Carter is also taking an active part in helping to provide "the man behind the gun" with suitable clothing and comforts and in this is being ably assisted by the Birkenhead residents.

The Late Captain Grayson.—This respected member of the firm of Messrs. H. & C. Grayson, we learn with much regret, died nobly in action on October 13th. Captain Ambrose D. H. Grayson, R.F.A., was the third son of the late Henry H. Grayson and Mrs. Grayson, of 12, Bolton Gardens, London, S.W., and until he rejoined the army took an active part in the management of the business. A memorial service for the gallant captain was held in St. Nicholas Church on October 21st.

The White Star Line.– It has been decided that the sailings of the *Olympic* will take place from the Clyde instead of Liverpool. This has been found desirable since the Gladstone Dock, already appropriated for the use of the Cunard Line, is at present being used by the Government, and also due to the fact that no suitable anchorage is at present available. Her passengers will have to join the vessel from Gourock, a good service of trains being arranged for. At the time of going to press, however, it is reported that after her arrival in the Clyde on October 27th, from New York, she will proceed to Belfast to be laid up until after the New Year.

Canadian Pacific Railway Co.—The new steamer *Missanabie* recently constructed by Messrs. Barclay, Curle and Co., arrived in the Mersey on September 30th, and left for Quebec and Montreal on October 7th. This fine vessel of 13,000 tons has a cruiser stern, and is fitted out in the most luxurious manner to carry 520 second and 1,200 third-class passengers.

The Isle of Man Steam Packet Co.—The returns of traffic, etc., of this Company, from May 1st to end of September, emphasize the effect of war upon holiday traffic. The total number of trips made between thirty-four ports were 2,060, showing a decrease of 371 trips and 135 fewer runs between Liverpool and Douglas. A total of nearly one million passengers were carried; over 24,000,000 have been carried since 1830, without any mishap due to faulty navigation. The winter service between Liverpool and Douglas is now being carried on by the R.M.S. *Snaefell* and *Douglas*.

Wallasey Corporation Ferries.—For some time past two new steamers were in contemplation for this ferry service. The Council has received tenders from five firms, but the building of the boats have been postponed for three months.

The Cunard Line.—At Queenstown on October 6th, a pleasing function took place, when Mr. T. S. Nichols was the recipient of a presentation in the form of a valuable piece of plate. Mr. Nichol, until recently manager of the Cunard Company at the Irish port, has now been transferred to the Liverpool office.

The Manchester Ship Canal.—The Copenhagen fleet of steamers bringing Danish produce to Hull and Harwich have, since the war, made the Mersey the distributing centre, as being more immune from danger, a small proportion going to Manchester *via* the Canal. Due to various causes, partly to the war, Manchester has been able to offer the better facilities for this produce, chiefly intended for the London market. The shippers have now decided to send all the steamers to Manchester. No less than four steamers arrived in one day, all of which had unloaded and left for Copenhagen the next day.

The Pacific Steam Navigation Co.—This Company's vessel the *Orduna* reached the Mersey on September 30th, having conveyed 550 French reservists from Valparaiso to La Rochelle-Pallice. Off Monte Video six sailors and two firemen were transferred to H.M.S. *Glasgow* as reservists, whilst a cadet, an ex-*Conway* boy, joined as a middy. Whilst outward bound 350 tons of mails were conveyed *via* the Straits of Magellan from Monte Video, due to the Trans-Andine railway being blocked with snow.

OBITUARY.

George Findlay Loudon.

With regret we have to place on record the death of Mr. George Findlay Loudon, chairman of Messrs. Loudon Bros., Ltd., Clyde Engineering Works, Johnstone, and of 39, West Campbell Street, Glasgow. The sad event took place at his residence, Orangefield, Monkton, Ayrshire, on Oct. 4th. Although in failing health for some considerable time he was going about as usual until a few weeks prior to his decease, and the news came as a melancholy surprise to his many local friends. Deceased, who was in his 65th year, was the founder of the machine-tool merchant business of Loudon Brothers, Glasgow, in 1871. In 1887 the firm acquired the machine-tool works of Messrs. A. McArthur & Son, Johnstone, where they specialized in the heaviest class of machine tools for engineers, shipbuilders, railway companies, etc. In 1904 the firm also acquired the machine-tool making business of Messrs. Sharp, Stewart and Co., Ltd., Glasgow, and about the same time it was formed into a limited liability company. With the designs and patterns of the Company named, and with extended workshops and plant, the variety and calibre of the Clyde Engineering Works' productions were enhanced, and under the managing directorship of Mr. James T. Stuart, who from its foundation had been associated with the firm of Loudon Brothers, the business has greatly developed. The deceased Mr. Loudon was a J.P. for Ayrshire and a member of the Ayrshire County Council, and was held in high esteem by a large circle of friends. The interment of his remains in Old Monkton Churchyard on Oct. 8th was attended by a large gathering of friends from Ayrshire and Glasgow.

LAUNCHES AND TRIAL TRIPS.

THE TYNE AND WEAR.

Sir W. G. Armstrong, Whitworth & Co., Newcastle-on-Tyne.

PRINCE EDWARD ISLAND. Launch, Oct. 5th. A train ferry built to the order of the Canadian Government to carry railway trains across the Northumberland Strait and so form the connecting link between the railway system on Prince Edward Island and the mainland. It is intended to maintain this service throughout all seasons of the year, consequently the vessel has been specially designed to cope with the severe ice conditions which obtain in winter in the Northumberland Strait. Principal dimensions are :—Length, 300 ft. ; breadth, 54 ft. ; depth, 24 ft. : draught when loaded with the largest cars used on the Canadian railway system, 18 ft. The vessel, although comparatively small has propelling machinery of considerable power which consists of three sets of triple-expansion engines, two of which are arranged aft and one forward. The scantlings are such that the machinery may be brought up all standing without damage when working at full power. Dining, smoking, and drawing-rooms, both for first and second-class, are provided above the railway deck, and the decoration of the first-class rooms is on a very elaborate scale. Special means of ventilation for use during the summer and liberal arrangements for heating during the winter months have been provided, so that the comfort of the passengers will be ensured under the extreme temperatures which are experienced in this service.

Wm. Doxford & Sons, Ltd., Sunderland.

ALBERT HALL. Launch, October 6th. Shelter deck vessel, built to the order of Messrs. Ed. Nicholl & Co., Cardifi. Length, 402 ft. ; breadth, 52 ft. ; moulded depth, 26¾ ft. D. W. capacity 8,200 tons. Classification is with the Bureau Veritas.

BREIFOND. Trial Trip, October 7th. This vessel, built and engined by the above firm, to the order of Sigval Bergesen, Esq., Stavanger, ran a successful sea trial, when a speed of 11 knots was attained with the vessel loaded down to her marks. The boilers, which are arranged to burn either coal or oil—the system for burning the oil being the "superheat" system of Messrs. Jack & Muers—gave the utmost satisfaction to all concerned, and proved most economical and effective. For Launch, see August issue.

J. T. Eltringham & Co., Ltd., Willington Quay.

ALEX. HASTIE. Trial Trip, September 21st. The official trials of this screw trawler, built and engined to the order of Messrs. R. Hastie & Sons, North Shields, have been run, everything proving highly satisfactory.

JOHN C. MEIKLE. Trial Trip, September 22nd. The official trial took place on this date of the above-named trawler, built to the order of Messrs. R. Irvin & Sons, Ltd., North Shields. The trial was in every way successful.

Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne.

NORTH-WESTERN MILLER. Launch, October 19th. This vessel, the first of two vessels ordered by Messrs. Furness, Withy & Co., and specially designed for the conveyance of flour, was launched on the above date. The two vessels will be of uniform dimensions and design, and, upon completion, they will enter the North Atlantic trade in the service of the Philadelphia Transatlantic Line, operating between London and Philadelphia. The vessels will each take the highest class at Lloyd's 100 A1, and they will have a length over all of 433 ft. 6 in., length between perpendiculars of 420 ft., extreme breadth of 53 ft. 6 in., and a depth moulded of 39 ft. The draught laden will be 26 ft. 9 in., and the draught in ballast and bunkers 16 ft. 6 in., whilst the cargo deadweight (including bunkers) will be 8,550 tons. The hull will be constructed on the three-deck principle, including shelter deck, with deep frames of heavy bulb angle section, the decks being carried on heavy tandem girders and side-spaced built pillars, thus keeping the holds and 'tween decks exceptionally clear for the convenient stowage of large and bulky cargoes. A cellular double bottom will extend fore and aft for water ballast, and water ballast will be carried in a deep tank built aft of the engine-room bulkhead, and in fore and after-peak tanks, giving a total capacity of about 2,500 tons. The vessel will be schooner-rigged, fore and main masts being built specially stong to deal with 25-ton lifts. Four derrick posts will also be fitted to deal with cargo in deep tank and No. 3 hatch, there being sixteen derricks in all, one of which will be fitted at the after side of the foremast to deal with the 25-ton lifts at No. 2 hatch. The topmasts will be fitted to suit wireless installation. Six cargo hatches will be fitted, four 26 ft. 6 in. by 18 ft., one 13 ft. 3 in. by 18 ft., and one 15 ft. 5 in. by 18 ft. Grain divisions and shifting boards will be in Nos. 2, 3, and 4 holds. An orlop deck is to be fitted for the full length of No. 1 hold for carrying special cargo. Eleven 7 by 12 in. powerful steam winches will be fitted with large barrels, whipping and warping drums, with a view to the quick loading and discharging of cargo. She will be equipped with the latest type of quick-warping windlass and Wilson-Pirrie type of steam-steering gear, with Brown's telemotor control, also hand-gear. The ventilation of the lower holds and 'tween decks has been specially considered ; four ventilators will be fitted to each hold and 'tween decks. Electric light will be fitted throughout the vessels, including twelve large cargo clusters, masthead, side and stern lights. A large dining saloon is to be amidships on the shelter deck for the captain and officers, the captain, chief officer and wireless operator will be berthed in a large steel deckhouse on top of the saloon house. Engines of the triple-expansion, direct-acting type, by Messrs. Richardsons, Westgarth & Co., Ltd., of Hartlepool, are to be placed amidships, and they will have cylinders 29 in., 49 in. and 80 in. by 54 in. stroke of piston, to pass the Board of Trade and Lloyd's. These will have three large single-ended boilers, each 17 ft. 6 in. by 12 ft., working at a pressure of 180 lbs. per square inch with Howden's system of forced draught, and they will have a total heating surface of about 10,450 square ft. The vessel will be capable of a speed of 13 knots.

Palmer's Shipbuilding and Iron Co., Ltd., Hebburn-on-Tyne.

ROUMELIAN. Launch. Steel screw steamer of about 325 ft. long, and to carry a deadweight of about 4,700 tons on a moderate draught ; she is to be classed 100 A1 at Lloyd's, and has a cruiser stern and two complete decks, with poop, bridge and forecastle ; water ballast is carried in the cellular double bottom all fore and aft, also in the after peak ; she has four large cargo hatches to holds and 'tween decks ; strong girders supported by built pillars are fitted to give clear space for shipping bulky cargoes. Accommodation for passengers in four state-rooms, with saloon, etc., is provided in large deckhouse at the fore end of the bridge deck. Special attention has been given to facilitate the rapid handling of cargo, and ten derricks and six powerful steam winches are fitted. The vessel is to be provided with triple-expansion surface-condensing engines, having a stroke of 42 in. Very ample boiler power is provided, and the boilers are fitted with Howden's system of forced draught.

CITY OF FLORENCE. Trial Trip, October 8th. This steel screw steamer, constructed to the order of the Ellerman Lines, Ltd. (the managers being the Hall Line, Ltd., of Liverpool), has been taken to sea for her trial trip. The steamer was taken for several runs over the measured mile, and successfully carried through a series of manœuvring trials. The engines worked very smoothly throughout, and the trials were in every way satisfactory. The vessel returned to the Tyne to coal after her trial. For Launch, see October issue.

Short Bros., Ltd., Sunderland.

FERRONA. Launch, Oct. 5th. Steamer built to the order of Messrs. W. Lowden & Co., of Liverpool, of the following dimensions :—Length, 399 ft. ; beam, 51 ft. ; depth moulded, 28 ft. 3¾ in. She is constructed on the single-deck principle to the Isherwood patent system of ship construction, with poop, long bridge and top-gallant forecastle, and will take Lloyd's highest class. The double bottom is fitted throughout vessel for the carriage of water ballast and the fore and after-peak tanks are also available for water ballast. Eight steam winches and ten derricks are fitted for handling cargo, and for warping ship, steam windlass, steam-steering gear on bridge deck in engine casing driven from wheelhouse, and connected by rods and chains to quadrant on rudder head, with hand gear and rudder brake on poop. The propelling machinery will be put on board by Messrs. George Clark, Ltd., of Sunderland, and consists of triple-expansion engines, with cylinders, 26½ in, 42 in., 70 in. by 48-in. stroke, driven by three large multitubular boilers of 180 lbs. pressure.

Swan, Hunter & Wigham Richardson, Ltd., Wallsend-on-Tyne.

MORVADA. Trial Trip. This twin-screw passenger and cargo steamer, built to the order of the British India Steam Navigation Co., has been for her trials. She is to trade in tropical waters, therefore ample ventilation is provided throughout the vessel and refrigerating machinery is installed in order to cool the various store rooms for provisions. All the inside state-rooms are arranged so as to have direct light and air from a porthole in the side of the ship, an ingenious arrangement due to Lord Inchcape, the chairman of the British India Steam Navigation Co. After a successful run the vessel was handed over to her owners. For Launch, see September issue.

Robert Thompson & Sons, Ltd., Sunderland.

BAJA CALIFORNIA. Launch, October 1st. Two-decked freight steamer, built to the order of A. O. Lindvig, Esq., of Christiania, Norway, and intended for carrying general cargo between Mexico and San Francisco. The vessel is built to take the highest class in Det Norske Veritas and to fulfil the requirements of the Norwegian Board of Trade, her principal dimensions being:—Length overall, 275 ft.; breadth, 38 ft. 6 in.; and depth moulded, 20 ft. 3 in. The erections consist of poop, 21 ft. long; bridge 64 ft. long (both available for cargo), and topgallant forecastle. There are four cargo hatchways, each with double derricks fitted on tables with crosstrees at mastheads and worked by six powerful steam winches, with donkey boiler in stokehold for supplying steam to the deck machinery. Ten cargo doors in the ship's side are also provided to facilitate rapid loading and discharging. A steam capstan is fitted on the poop for warping purposes, and a patent direct steam windlass on the forecastle deck. The steam-steering gear is placed in the after end of the engine casing, with hand-steering gear aft. The engines are by Messrs. The North Eastern Marine Engineering Co., Ltd., Sunderland, having cylinders 20 in., 33 in. and 54 in., with a stroke of 36 in., steam being supplied by two large boilers working at a pressure of 180 lbs. per square inch. Both the main and Cochran (Annan) donkey boilers are specially designed for burning either oil or coal fuel, on the Wallsend Howden system. The oil fuel is carried in the cellular bottom, with the exception of the portion under the boilers. The cellular bottom can also be used for water ballast, together with the fore and after peaks. There are ten oil tanks, and owing to the stiff nature of the oil several rows of steam pipes are fitted in each tank with a steam coil placed immediately over the suction rose for thinning purposes to enable it to flow freely to the pumps. There is a complete plant of electric light fitted throughout the vessel, provision being made for wireless telegraphy.

THE TEES AND HARTLEPOOLS.

Craig, Taylor & Co., Ltd., Stockton-on-Tees.

VALDES. Trial Trip, October 14th. Steel screw steamer built to the order of Messrs. Robert MacAndrew & Co., of London, has been for her loaded trial trip, which proved highly satisfactory. During the whole of the run everything worked with the greatest smoothness and a speed of 11 knots was maintained. After the trial trip the vessel proceeded to Barcelona under command of Captain Taylor. For Launch, see September issue.

Craig, Taylor & Co., Ltd., Thornaby.

BANCHORY. Launch, October 19th. Single-deck screw steamer. Dimensions, 298 ft. by 44 ft. by 21 ft. 4 in. moulded. The vessel is built of steel to the highest class in Lloyd's registry, under special survey, and has poop, bridge and topgallant forecastle; water ballast in double bottom fore and aft and in peaks. She is equipped with patent steam windlass with quick-warping ends, steam-steering gear, double steam winches and double derricks to each hatch; telescopic masts and all the latest improvements for rapid loading and discharging. Her engines have been constructed by the North-Eastern Marine Engineering Co., Ltd., Sunderland, the cylinders being 21 in., 35 in., 57 in. by 39 in., with two large steel boilers working at 180 lbs. pressure. She is also fitted with a large donkey boiler working at 100 lbs. pressure. The vessel has been built to the order of Messrs. Monroe, Rutherford & Co., Cardiff.

Sir Raylton Dixon & Co., Ltd., Middlesbrough.

ASIA. Launch, Sept. 21st. Screw passenger and cargo steamer, built to the order of the National Steam Navigation Co., Ltd., of Greece. Dimensions:—Length, 274 ft.; breadth, 40 ft.; depth moulded, 22 ft. 6 in. The vessel is being constructed under special survey to British Corporation highest class and to Board of Trade requirements for passengers. She will have accommodation for about 100 first-class, 90 second-class, and about 200 third-class passengers. Steam heating is fitted to all accommodation, and Marconi wireless telegraphy will be installed. The engines will be supplied from Sunderland, having cylinders 23½, 38 and 62 in. by 39-in. stroke, taking steam from two large single-ended boilers, working at 180 lbs. pressure. A Cochran (Annan) donkey boiler with patent seamless furnace, has been supplied.

OSWALD. Launch, Sept. 23rd. Steel screw passenger and cargo steamer constructed to the order of the Booth Steamship Co., Ltd., of Liverpool. The vessel is 390 ft. 9 in. in length, 51 ft. 9 in. in breadth, 32 ft. 3 in. in depth moulded to upper deck and will carry over 7,200 tons deadweight on a light draught of water. Of the two-deck type with poop, bridge and forecastle, the steamer is being built under special survey to receive Lloyd's 100 A1 classification and to have British Board of Trade Passenger Certificate. She will also comply with the requirements of the U. S. A. Government and will carry a large number of first-class passengers and emigrants. At fore end of bridge on upper deck will be the lounge and first-class state-rooms with dining saloon immediately above at fore end of bridge deck, while on the same deck abaft funnel will be located the smoking room. She will have two masts, thirteen derricks, including one for fifty tons, lifts, six holds, eight watertight bulkheads, five lifeboats, large refrigerating space with machinery and cold chambers, fire extinguishing apparatus, electric light and bells, and the equipment will consist of nine powerful steam winches, steam windlass, telemotor steering gear, etc., and all the latest appliances for the comfort and safety of passengers and the expeditious handling of cargo. Triple-expansion engines, having cylinders 25½ in., 41 in. and 68 in. by 48 in. stroke, supplied with steam by three large single-ended boilers working at 180 lbs. pressure, with Howden's system of forced draught and Schmidt's system of superheating, will be fitted by the North Eastern Marine Engineering Co., Ltd., Wallsend-on-Tyne.

Wm. Gray & Co., Ltd., West Hartlepool.

PRIKONISOS. Trial Trip, Sept. 23rd. This vessel, built for Messrs. Pandeli Bros., Constantinople, left Hartlepool on the above date on her maiden voyage. The vessel is built to the highest class in Lloyd's register, and is of the following dimensions:—Length, 362 ft.; breadth, 50 ft.; and depth 25 ft. ½ in. The trials which were previously run were in every way satisfactory. For Launch, see September issue.

Irvine's Shipbuilding & Dry Docks Co., Ltd., West Hartlepool.

CHEVIOT RANGE. Trial Trip, October 15th. On the above date this steel screw steamer proceeded on her official trial trip in Hartlepool Bay. The vessel has been built to the order of Messrs. Furness, Withy & Co., Ltd., for the Neptune Steam Navigation Co., Ltd. Throughout the trial the engines and all auxiliaries worked admirably, a speed of 12½ knots being attained, and the vessel afterwards proceeded on her voyage. For Launch, see October issue.

THE HUMBER.

Cochrane & Sons, Ltd., Selby.

SCOMBER. Launch, October 6th. Steel screw trawler built to the order of Messrs. The Mount Steam Fishing Co.

Ltd., Fleetwood, and fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., Hull. Dimensions 130 ft. by 24 ft. by 13 ft. 9 in. moulded.

TAIPO. Launch, Sept. 22nd. Steel screw trawler, built to the order of Mr. H. L. Taylor, of Grimsby, and fitted with powerful triple-expansion engines by Messrs. Amos & Smith, Ltd., of Hull. Dimensions 125 ft. by 22 ft. 3 in. by 12 ft. 9 in. moulded.

SCOTLAND.

Barclay, Curle & Co., Whiteinch.

MISSANABIE. Trial Trip, Oct. 2nd. This twin-screw steamer, which ran her trials on the Clyde on the above date is of the intermediate type, or one-cabin class. She is a sister ship to the *Metagama*, which the same builders are to launch early in November for the same service, *viz.*, the Atlantic service of the Canadian Pacific Railway Company. She is 520 ft. in length, 64 ft. in breadth, and 41 ft. in depth. She has accommodation for 520 cabin passengers, berthed in large airy rooms, and 1,200 third-class, also in large rooms. The principal feature in her design is the very fine accommodation for passengers. What is nominally second-class is really first-class in character, and the passenger rooms and cabins all through are remarkably commodious and comfortable. On trial the vessel ran over the measured mile for a series of six double runs. On the last two of these she attained a mean speed of 17½ knots, which is a knot and a half higher than that required on regular service. For further particulars see Launch, August issue.

Bow, McLachlan & Co., Paisley.

MAKO. Trial Trip. This new steamer, built for the Union Steamship Company of New Zealand, has run trials on the Clyde. The trials were of an exhaustive character and were most satisfactory, the speed being in excess of contract requirements. The *Mako*, which has sailed for New Zealand, has been designed for service as a passenger and cargo steamer. For Launch, see August issue.

George Brown & Co., Greenock.

USTARITZ. Trial Trip, Sept. 16th. This steamship for La Cie. des Chargeurs Français (Messrs. Plisson & Co., of Paris Bayonne and Cardiff) has carried out her speed trials on the Firth of Clyde. When on full speed trial she easily maintained a mean speed of 10½ knots, everything working satisfactorily. She has been specially designed for the owners' trade, and built under special survey and to the highest classes of Lloyd's and Bureau Veritas. Triple-expansion engines have been supplied having cylinders 17½, 27½ and 45 in. by 33-in. stroke, and two main boilers with a working pressure of 180 lbs. The launch of this vessel was reported in our September number, page 61, under the name of "Austaritz." The correct spelling of the name is as given at the head of the report.

Hall, Russell & Co., Ltd., Aberdeen.

BEN SCREEL and BEN GULVAIN. Launches, Sept. 30th. Two trawlers, built for Messrs. Richard Irvin & Sons, Aberdeen. Dimensions:—Length between perpendiculars, 115 ft.; breadth, 22 ft.; and depth, 12 ft. 9 in.

Harland & Wolff, Ltd., Glasgow.

APAPA. Launch, Sept. 30th. Twin-screw passenger steamer built to the order of the African Steamship Company, London (Messrs. Elder, Dempster & Co., Ltd. Liverpool, managers). The vessel is 425 ft. long between perpendiculars and 57 ft. beam, with a gross tonnage of about 8,000, and is built on the latest principle of watertight construction, with double bottom extending right fore and aft. She has five steel decks, and will have sumptuous accommodation for a large number of first and second-class passengers, also for a number of third-class, the state-rooms being large and airy, and the public rooms exceptionally fine, the dining saloons extending the full breadth of the vessel. The lounge and smoking rooms are situated in the best parts of the ship. The arrangements for working ship and cargo are of the latest and most approved type, and the vessel will have a wireless telegraph installation. There will be a complete installation of electric light, and the propelling machinery consists of two sets of four-cylinder quadruple-expansion balanced reciprocating engines, also constructed by the builders of the vessel.

D. & W. Henderson & Co., Ltd., Partick, Glasgow.

LOMPOC. Launch, October 5th. Steel screw tank steamer built to the order of the Bear Creek Oil & Shipping Co., Ltd. (Messrs. C. T. Bowring & Co., Ltd., managers). The vessels' dimensions are 448 ft. by 56 ft. by 33 ft. 6 in. with a D.W. carrying capacity of about 10,500 tons; she is constructed on the Isherwood longitudinal system to class 100 A1 at Lloyd's, and is of the two-deck type, with poop, bridge and forecastle. Water ballast is carried in double bottom under the boilers and in a deep tank forward of oil compartments and also in forward and after peaks. The vessel is fitted to carry oil in bulk, for which purpose she has ten holds with centre divisional bulkheads making twenty tanks, and in addition to this she has a larged-sized cargo hold forward. An expansion trunk extending 6 ft. above the upper deck is fitted the full length of the oil compartments and summer tanks are fitted in the 'tween decks. Two pump rooms are fitted in which are placed three powerful oil pumps connected to a double line of pipes. Ample bunker capacity is retained aft for both coal and oil fuel. The vessel is replete with everything necessary for the working of the cargo and the safety of the ship, and includes two steam winches, refrigerating chambers for crew's provisions and a complete installation of electric light. The machinery, which has also been constructed by Messrs. Henderson, is, as in the most recent type of oil steamers, placed aft and consists of triple-expansion engines, having cylinders 27 in., 46 in. and 76 in. dia. by 48-in. stroke, three single-ended boilers worked on Howden's forced draught system at 180 lbs. pressure. The boilers are arranged to burn either coal or oil, the oil-fuel burning installation being on the Wallsend-Howden system. The *Lompoc* is, with one exception, the largest oil-tank steamer yet built on the Clyde.

Ramage & Ferguson, Leith.

CHAKDINA. Launch, Sept. 22nd. Steamer built for the B. I. S. N. Company. Dimensions:—Length, 330 ft.; beam, 46 ft.; depth, 24 ft. 6 in., and measurement about 3,100 tons gross. Accommodation is provided for first and second-class passengers and for a large number of natives. There are three cargo holds with a large carrying capacity. The vessel will be propelled by triple-expansion engines, supplied with steam by four large single-ended boilers, working at 215 lbs. pressure.

Russell & Co., Glasgow.

TAKATA MARU. Launch, October 5th. Twin-screw steamer built to the order of the Nippon Yusen Kabushiki Kaisha, of Tokio, her dimensions being 445 ft. between perpendiculars, 58 ft. in breadth moulded, and 34 ft. in depth moulded. She is built to the highest class at Lloyd's, and also to Teishinsho Special Survey, and is about 6,700 tons gross. Electric light, provision for canal projector, and wireless telegraphy are installed. She will be fitted with twin-screw triple-expansion machinery, 20 in., 33½ in., and 56 in. in diameter by 48-in. stroke. Four single-ended multitubular boilers, with a working pressure of 200 lb., will supply the steam. The machinery is being fitted by Messrs. David Rowan & Co., Glasgow.

Alex. Stephen & Sons, Ltd., Linthouse.

UMETA. Launch, October 1st. Screw steamer for the general cargo service of the B. I. S. N. Co., Ltd. The *Umeta* is a sister ship to the s.s. *Umaria*, recently delivered by Messrs. Stephen to the same owners. Dimensions:—Length, 410 ft., breadth, 52 ft.; depth, 31 ft. She is designed for the cargo trade, with a large number of winches and derricks of superior type. The propelling machinery, consisting of one set of triple-expansion engines, with three large single-ended boilers, will be supplied by the builders.

IRELAND.

The North of Ireland Shipbuilding Co., Ltd., Londonderry.

VAN STIRUM. Launch. Built for Messrs. Wambersie and Zoon, Rotterdam, and is a sister ship to two vessels built at Wallsend for the same firm, which were recently delivered. Dimensions:—343 ft. long; 45 ft. broad; moulded depth to awning deck 28 ft. There will be accommodation for thirty first-class passengers. Special provision will be made for the carriage of fruit and holds throughout the vessel will be insulated and refrigerated specially for the carriage of bananas. Wireless telegraphy will be installed. The propelling machinery, which has been constructed at Greenock, and which will be fitted at the builders' crane in 'Derry, consists of triple-expansion engines and specially large forced-draught boilers.

BOARD OF TRADE EXAMINATIONS.

SEPTEMBER 24th, 1914.—LONDON.—*1st Class :* R. Billett, A. Roake. *2nd Class :* J. Barrett, A. Dowsett, S. Holdway, W. Jenkin, G. Swan.

NORTH SHIELDS.—*1st Class :* P. Cooney, W. Thomas, C. Tinn, D. Williamson. *2nd Class :* W. Bates, J. Harding, J. McLeod, F. Ridge, T. Smith, J. Wright.

HULL.—*1st Class :* J. Carruthers. *2nd Class :* E. Frith, C. Methley, R. Wright.

BRISTOL.—*2nd Class :* L. James.

LIVERPOOL.—*1st Class :* H. Hamilton, J. Peter. *2nd Class :* L. Doyle, S. Richardson, E. Rodick, A. Vernon.

GREENOCK.—*1st Class :* A. Allan, A. McCall, R. McCall, H. West. *2nd Class :* C. Bamber, W. Campbell, A. Hood, J. Moore, J. Orr.

ABERDEEN.—*2nd Class :* J. Paterson.

SUNDERLAND.—*1st Class :* E. Huntley, R. Laidler. *2nd Class :* J. Dyer, H. Elders, W. Howey, W. Raine.

OCTOBER 1st, 1914.—LONDON.—*1st Class :* W. Brock, N. Hodge, C. Watkinson. *2nd Class :* H. Asker, F. Coursens, E. Law, W. Townend.

GLASGOW.—*1st Class :* W. Lambie, W. Stevenson, N. Walker. *2nd Class :* T. Berry, J. Croll, H. Tarleton, R. Templeton.

LEITH.—*1st Class :* A. Anderson, A. Hamilton. *2nd Class :* D. Chalmers, T. Porteous, J. Poustie.

CARDIFF.—*1st Class :* J. Travers. *2nd Class :* F. Heke, P. Waugh.

SOUTHAMPTON.—*1st Class :* J. Wilmot. *2nd Class :* W. Keohane, S. Parker, J. Walls.

LIVERPOOL.—*1st Class :* T. Cookson, G. Jones, N. Martin, W. Middleton, E. Mitchell, J. Pattinson, J. Sheppard. *2nd Class :* W. Christie, T. Holland, G. Morgan, W. Taylor, R. Williams.

NORTH SHIELDS.—*1st Class :* A. Hill, H. Inness, J. Muir, A. Robson. *2nd Class :* J. Bruce, J. Hern, E. Mack, C. Sorenson, F. Taylor, A. Wold.

BELFAST.—*1st Class :* J. Alexander, W. Duncan. *2nd Class :* W. Good, G. Houston, J. Lowny, W. Mulholland.

OCTOBER 8th, 1914.—LONDON.—*1st Class :* I. Jones, E. Latham, S. Reynolds. *2nd Class :* T. Scott, C. Tewsley.

NORTH SHIELDS.—*1st Class :* D. Younger. *2nd Class :* J. McCabe, E. Miller, G. Thomson, W. Wilson.

LIVERPOOL.—*1st Class :* W. Crompton, A. Parker. *2nd Class :* W. Forrest, E. Kaye, H. Munday, J. Nevison, G. Whitelaw.

GLASGOW.—*1st Class :* J. Ramsey. *2nd Class :* J. Davidson, G. Mercer, F. Ryan.

OCTOBER 15th, 1914.—LONDON.—*2nd Class :* B. Arrowsmith, F. Byrne, A. Verman.

HULL.—*1st Class :* J. Woodhead. *2nd Class :* F. Moon, D. Wilson.

DUNDEE.—*2nd Class :* D. Drummond, C. Falconer, A. Smeaton.

NORTH SHIELDS.—*1st Class :* N. Walker. *2nd Class :* A. Atkinson, J. Byrne, G. Gardiner, R. Key.

LIVERPOOL.—*1st Class :* F. German, J. Liversage, W. McIntyre, D. Owler, W. Stopforth, W. Watson. *2nd Class :* W. Hawson.

GREENOCK.—*1st Class :* T. Aikman, H. Dalgleish, B. Fiddes, J. Girvan, D. Mills, M. Waldrop, A. Wilson. *2nd Class :* W. Aitken, G. Dunlop, T. Jordan, J. Linney, J. McGugan.

Mr. R. A. Lenski, of 114, Fenchurch Street, London, E.C., has undertaken to compile a directory of British manufacturers in the Russian language in order to assist the extension of British exports to that country. He will be pleased to enter into correspondence with those who desire to bring their manufactures before Russian buyers.

Abridgments of New Patents.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

11,293. Ships' trim indicators. A device for indicating a ship's trim comprises a spirit-level b mounted in a frame c pivoted at one end to an adjustable bracket d and at the other end to a link g which can be moved vertically by a screw f mounted in a bearing h. One end of a wire i is secured to the screw at j, the wire being wrapped around the thread of the screw and then passing around a flange k at the base of a drum l. The drum is mounted on a spindle m and has within it a clock-spring, one end of which is secured to the spindle, the other end bearing against the periphery of the drum. The periphery of the drum is graduated to show the tilt for various lengths of ship, and a pointer o^1 can be moved vertically along guide-rods o to a position corresponding to the length of the ship. The connection of the level with the bracket d can be adjusted by a screwed pin e. In the modification shown in Fig. 5, the wire i is connected to a sliding weight t carrying flat graduated members x or pointers which project through a groove v and are read against graduations on the guide-member r.

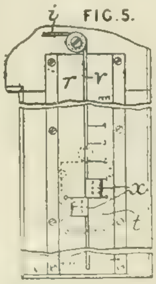


FIG. 5.

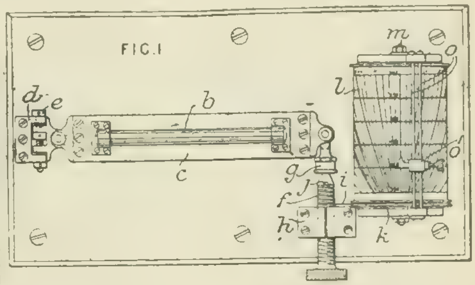


FIG. I

11,389. Cleaning boiler-tubes. For cleaning the smoke-tubes of a boiler having a combustion chamber at the back, a steam-pipe in one of the smoke-tubes is arranged to project a revoluble nozzle into the combustion chamber, whereby a jet of steam is directed along the tubes from back to front. In one of the smoke-tubes d is fixed, by means of a gland c^2 and collar c^3, a pipe c through which passes a tube b having a nozzle a with apertures a^1 and secured by a lock-nut b^1.

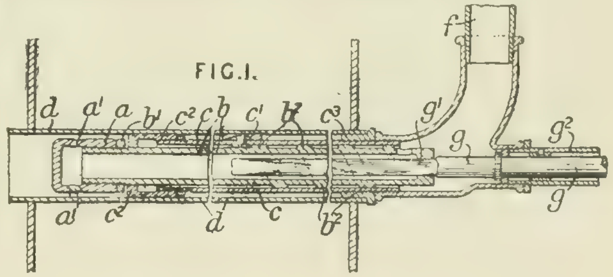


FIG. I.

Steam is supplied through a pipe f, and the tube b is rotated by the squared end g^1 of a spindle g passing through a casing g^2 and having a hand-wheel outside the smoke-chamber. As the tube b rotates, it is caused to travel longitudinally, so that the nozzle a is projected out of the tube d, by means of a helical thread b^2 which engages a projection c^1. In the case of double-ended boilers, the nozzle a may be replaced by one having forwardly-directed jets. The nozzle and nozzle tube may be advanced by fluid pressure and withdrawn by a spring.

Panama Pacific International Exposition.—At the urgent request of a number of yacht clubs, the management of the Panama-Pacific International Exhibition has decided to postpone the yacht regatta from April, 1915, to August-September of the same year.

FLEETS OF THE MAIN LINES.

(*Continued from page* 94.)

The German Cruisers "Emden" and "Karlsruhe." have been busy in their respective spheres of action. Off the coast of Cochin China the former vessel has sunk the Holt liner *Troilus*, homeward bound with a large general cargo, including rubber and tin. This was a vessel of over 7,500 tons gross register, launched as recently as December last by Messrs. Hawthorn, Leslie & Co., of Newcastle. Next in size amongst the victims was the British India Company's *Chilkana*, of 5,146 tons, outward bound to Madras and Calcutta. She was also a new vessel from the yard of Messrs. Wm. Gray & Co., of Hartlepool. Then came the *Benmohr*, owned by Messrs. Wm. Thomson, of Leith, a vessel just two years old, built by Messrs. Scott & Co., of Greenock; and the Clan liner *Clan Grant*, of just under 4,000 tons. She was some twelve years old, and was a turret-decked vessel constructed at Sunderland by Messrs. Doxford. The new dredger *Ponrabbel*, on her way out to her station for the Harbour Board of Launceston, Tasmania, was another victim. The crews of all these vessels were landed at Cochin by the *St. Egbert*, of Liverpool, to whom they had been transferred by the cruiser, which retained another captive, the *Exford*, as a collier for the future replenishment of her bunkers.

It is now known that the Nelson liner *Highland Hope*, the Indra liner *Indrani*, the Nautilus Steam Shipping Company's *Maple Branch*, and the Glasgow steamer *Strathroy*, which have been uninsurable for some little time, with some eight other vessels, have fallen to the *Karlsruhe* in the Atlantic, their crews being landed in the Canaries by the German steamer *Crefeld*. But these losses, serious as they sound when set out, are nothing to pay for the command of the sea and the maintenance of our commerce, and it is clear that the pirates must now soon reach the end of their tether.

The Cunard Line.

The announcement is made that the Cunard liner *Campania*, in her time the fastest ship on the Atlantic, has been sold to Messrs. T. W. Ward & Co., of Sheffield. So her day is over and she will soon be on the scrap heap. The advent of the *Aquitania* displaced her from the mail service, and she is too fast and costly a ship to find other employment. Since the coming out of the *Aquitania* she has taken a turn or two for the Anchor line from Glasgow, and has also filled a useful gap on her old service when the requirements of the Admiralty temporarily removed other vessels from the fleet.

The Caronia,

which is still working as an auxiliary cruiser for the Admiralty, has had her little adventure, though it was not one of such a martial nature as that of her sister, the *Carmania*. Off the American coast the *Caronia* has taken as prize the United States steam-tanker *Brindilla* and brought her into Halifax. This capture raises some important legal questions, for the *Brindilla* was formerly the German steamer *Washington*. Her transfer to the United States Register was made under the new Registry Act, and took place some little time subsequent to the outbreak of the present war, so that the question of the legality of a transfer under the Act will need consideration and decision by the Prize Court.

"NOMOS" AND "FAROLA" COMPOSITIONS.—"Nomos" compositions for ships' bottoms and "Farola" anti-corrosive compositions for ships' holds, boot-tops, etc., the manufactures of Messrs. R. T. Bruce & Co., of Sitwell Street, Groves, Hull, have now been on the market for over twenty-four years. Many of their customers have used these compositions for long periods, and the firm are in the happy possession of a number of testimonials from satisfied customers. The members of the firm of Messrs. R. T. Bruce & Co. and the staff are all British and of British descent, and the firm has no branch, affiliated or subsidiary companies, or works, making, or partly making, their compositions abroad. The whole of this Company's compositions, both for home and foreign markets, are manufactured in England, and it will thus be seen that their compositions are essentially and entirely British in every respect. Messrs. R. T. Bruce & Co. are the sole manufacturers, and they have agents or stocks in every important port in the British Isles, and several in foreign countries and the Colonies.

INSTITUTE OF MARINE ENGINEERS.

DENNY GOLD MEDAL AWARD.—The Denny Gold Medal for Session 1913-1914 has been awarded to Mr. G. James Wells (member) for his paper on "Thermodynamics and Refrigeration."

ESSAY COMPETITIONS.—The following awards have been made in conjunction with the above:—ASSOCIATE MEMBERS. Subject: "Superheated Steam, the advantages of its use, different systems and the application of these in Modern Marine Practice." 1st. Nom-de-plume: "Surchauffe." Author: Mr. W. Smith, £1.

ASSOCIATES. Subject: "The Governor; different styles and their application to Marine Machinery and High-Speed Auxiliaries." 1st. Nom-de-plume: "Regulator." Author: Mr. R. J. Walker, £1 10s.

GRADUATES. Subject: "Liquid Fuel; description of its use and application to Marine Boilers." 1st. Nom-de-plume: "Dominion." Author: Mr. A. J. Walker, £1. 2nd. Nom-de-plume: "Crudeoil." Author: Mr. O. Bertram, 15s.

OPEN COMPETITION. Subject: "The Modern Condenser, main and auxiliary, with all necessary Pumps and Appliances connected therewith." 1st. Nom-de-plume: "Finnieston." Author: Mr. J. S. Macpherson, £1. 2nd. Nom-de-plume: "Helix." Author: Mr. C. P. Tanner, 15s.

REVIEWS.

Brown's Slide Valve for Engineers, by W. H. Thorn, published by Messrs. James Brown & Son, Glasgow, has been written specially for sea-going engineers and all candidates for second and first-class B.O.T. Certificates. It has been the object of the author to give all necessary information to enable the reader to attain to a thorough understanding of the importance of slide valves and gearing; but at the same time to avoid bringing in a mass of intricate matter which the marine engineer, preparing for his examination, does not require. A further endeavour of the author has been to bring all information before his readers in as near as possible a manner as though he were speaking to them in the classroom. The illustrations are a prominent feature of the book. They are very considerable, executed in good style, and will be much appreciated by the reader, as the different actions, details and arrangements shown are more readily understood. Mr. Thorn has given us a very well-written book on the subject of the slide valve, and it should find many readers. The volume, which is well printed, and of convenient size, comprises over 120 pages, a complete index, and is published at 2s. 6d.

Port of Immingham.—The Great Central Railway has issued the first number of a well-printed and illustrated book, which is intended, from time to time, to give interesting and useful information to the coal-owner and colliery manager, as well as the exporter and the many business firms associated with coal, colliery machinery, etc. The publication is named "The Magnet of Commerce," and its first number bears out the promises made for it. In its comprehensive information we find particulars of the output of coal by counties in the United Kingdom for 1913; output and value of coal in 1912; coal exports in 1913; preparation of coal for market; the making of coke; types of coke ovens in use in 1912, etc., etc. The chapter on the distribution of coal shows the many facilities possessed by the Port of Immingham to achieve this object in an economical and efficient manner. Two large coloured illustrations are issued with the book, one showing the colliery and industrial districts, and the other a bird's-eye view of the Immingham (Grimsby) deep-water dock.

HESSE REVERSING GEAR.—Messrs. J. W. Brooke & Co., Ltd., of Lowestoft, inform us that they have just purchased the whole of the drawings, patterns, machining jigs and templates for the well-known "Hesse" reversing gear, recently manufactured by Messrs. Hesse & Savory. Messrs. Brooke are immediately starting on the manufacture, for stock, of a series of these reverse gears, which they hope will fulfil all high-class requirements, and no time will be lost in making prompt deliveries. The gears will be constructed in the highest possible manner.

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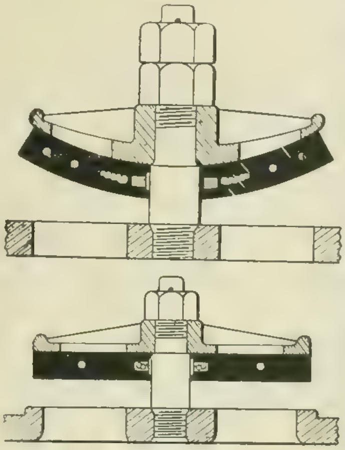

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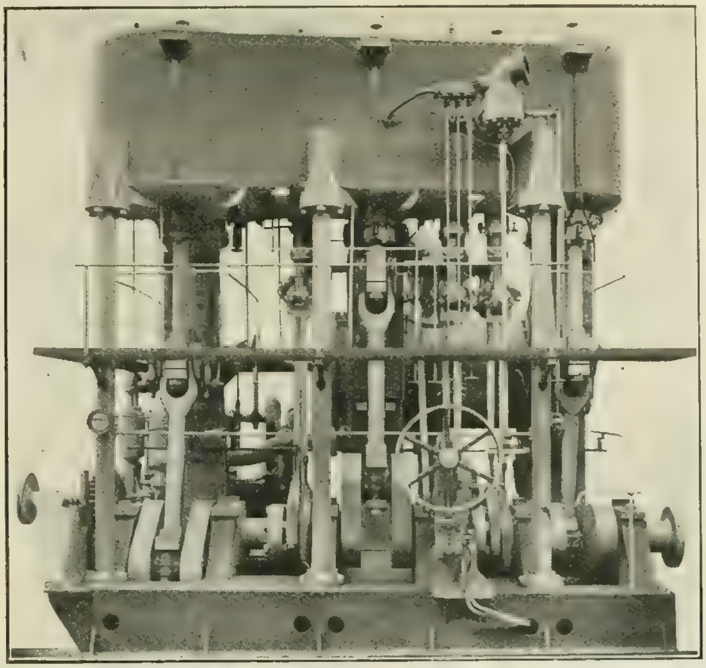

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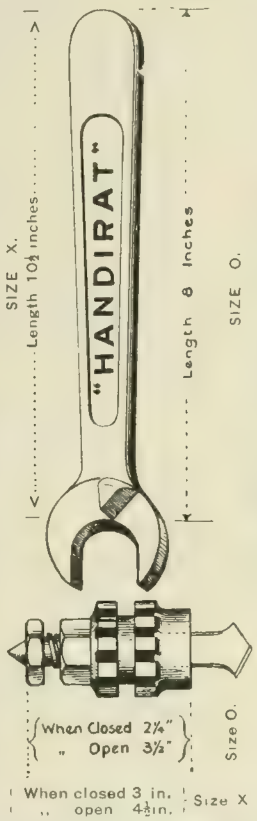

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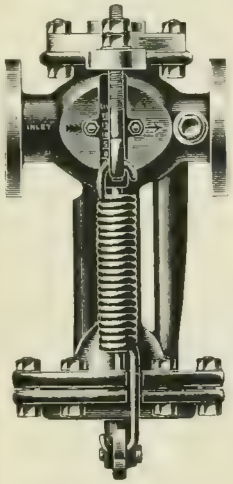

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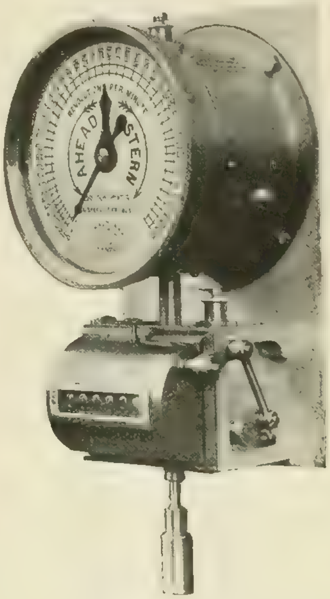

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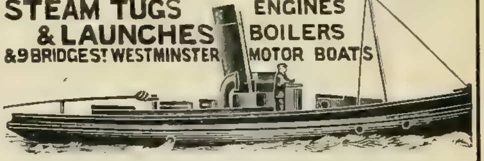

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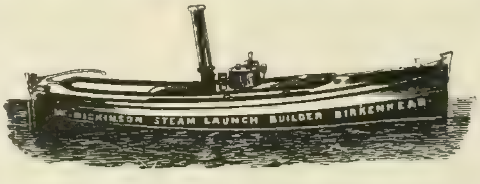
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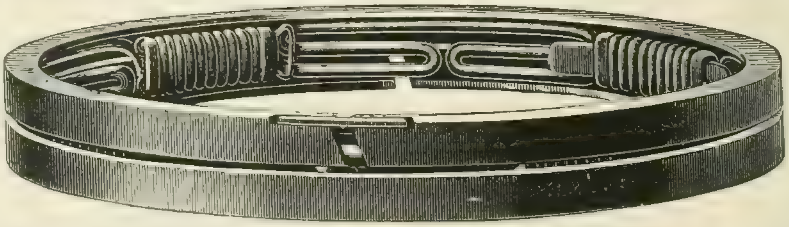

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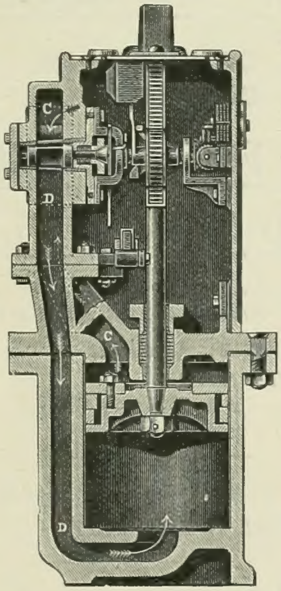

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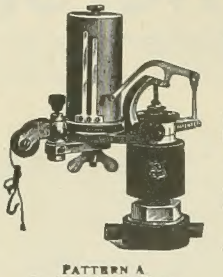

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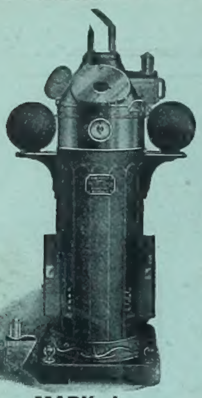

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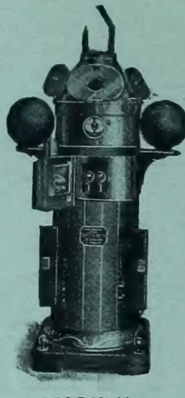

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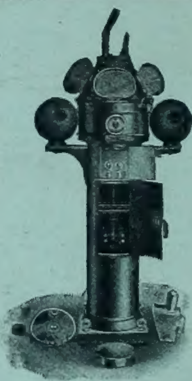

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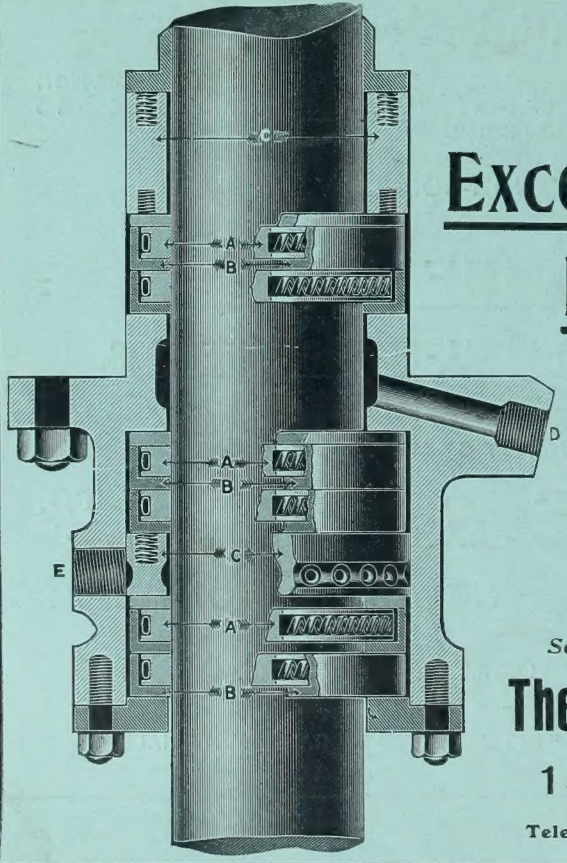

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